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SURGICAL COMPLICATIONS OF DUODENAL ULCER

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IN 1932 and 1933, the incidence of duodenal ulcer among all patients observed in our clinic was 3.2 per cent. In 1945 and 1946, the incidence was 6 per cent. A similar increase has been reported by other surgeons during recent years. From these experiences, it is obvious that we should pursue more diligently than ever our efforts to avoid the various diagnostic and therapeutic pitfalls in both medical and surgical ulcers.

Every physician is familiar with the classic features of duodenal ulcer: the epigastric pain or gnawing, hunger sensation which appears after meals and often in the middle of the night as well, and is relieved by the ingestion of food; in many cases, the seasonal recurrence of the attacks followed by periods of remission; and in a large number, the presence of hemorrhage of varying degree. Not every ulcer, however, is classic in its manifestations. A small group of patients describe nothing more definite than an abdominal discomfort, gaseous eructation, water brash or heart burn, nausea with occasional vomiting, intermittent diarrhea, and loss of appetite, weight and strength. Again, one may observe patients in whom functional states give rise to epigastric pain and discomfort similar to that produced by duodenal ulcer. This problem is encountered most often in those who have undergone several examinations and, having learned the signs of ulcer, give misleading statements regarding their symptoms. The experienced clinician, however, can usually detect such patients and, by adroit questioning, properly interpret their complaints.

It is also possible for extragastric lesions, such as appendicitis and cholecystitis, to produce symptoms so closely resembling those of ulcer as to deceive even the most painstaking examiner. Just recently, I explored a patient who had been referred after a diag-

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nosis of cholecystitis by two able clinicians. Instead of a diseased gallbladder, I found an obstructing duodenal ulcer. Again, appendicitis or cholecystitis may be coexistent with the ulcer and may dominate the picture completely, causing the duodenal lesion to be overlooked until the patient comes to exploration. Several years ago, we made a study of a series of cases of surgical cholecystitis; in 9.6 per cent, a duodenal ulcer was discovered either during the examination or at operation.

Regardless of how clear the symptoms, gastric analysis to establish the acid level, and a roentgenographic study of the stomach should be routine measures in the examination, when possible. The acid level is usually high, especially in young individuals, and a deformity of the duodenal cap is practically a constant feature. From the symptoms, one may easily confuse a gastric with a duodenal ulcer. In gastric ulcer, however, the roentgenogram will show the deformity of the proximal side of the cap. Occasionally, both gastric and duodenal ulcers are observed in the same patient; we have found this to be true in 3.3 per cent of our patients who have had stomach resection.

The large majority of patients with duodenal ulcer are relieved by proper diet and medical measures. According to our experience, however, about 30 per cent sooner or later perforate, produce hemorrhage, obstruction or both, or otherwise become intractable to medical management. Not infrequently, also, one encounters a reactivated duodenal ulcer or a gastrojejunal ulcer, or perhaps both, following a previous operation. These complications call for surgical intervention, the choice of the procedure depending upon the symptoms and findings in the individual case.

Perforation.—Ulcers which perforate into the abdominal cavity are situated on the anterior wall of the duodenum. They may be divided into two types: acute or unprotected, and chronic or protected. We have found that approximately 13 per cent of all surgical ulcers are of the acute, unprotected type, and many of them perforate without previous warning of the disease.

Even the novice can recognize an acute perforation of a duodenal ulcer. Characteristic are the patient's expression of excruciating pain, the pale, clammy skin, the boardlike rigidity and exquisite tenderness of the abdomen. That the patient lies perfectly still, resenting any movement or any attempt at an examination is likewise characteristic. Nausea and vomiting are present in some cases; in others, lacking. During the early hours following the catastrophe, the temperature remains normal or subnormal, and the blood pressure and pulse rate are not elevated. The acute manifestations then

subside to some extent and the patient seems slightly more comfortable, though the abdominal tenderness and rigidity persist. If surgery is not undertaken immediately, this phase is soon followed by signs of bacterial peritonitis; the temperature and leukocyte count rise, the pulse rate is increased, the pulse volume is reduced and the abdomen becomes distended. A plain film often reveals gas beneath the diaphragm. In the presence of these findings, surgery is urgent. One should never wait for this stage, however; instead, the abdomen should be opened as soon as possible after the signs of perforation appear.

In operating for a perforated ulcer, we prefer the upper transverse incision, as suggested by Schwyzer. This incision is similar in principle to the McBurney incision in the lower abdomen, in that it follows anatomic lines. Disruption of a vertical wound after closure of a perforation is a common occurrence, whereas the transverse incision has little tendency to disruption, even though infection develops.

In making the closure, no suture is placed around the perforation itself. A purse string is likely to cut through the tissues, producing leakage, or by heaping up the tissues, lead to further inflammation, edema and obstruction. Instead, four mattress sutures are inserted in the duodenum and in the pyloric end of the stomach, the stomach is drawn over the ulcer, and a segment of omentum is tied over the area, according to the method described by Gatch. In not a single case has obstruction or leakage been observed since we began using this procedure, several years ago.

If the patient comes to operation within 12 hours after the perforation, it is our custom to place sulfanilamide in the peritoneal cavity and in the incision, and close the abdomen without drainage. After 12 hours, if bacterial peritonitis is anticipated, drains are inserted to the liver fossa and brought out through a stab wound in the side, to be removed a few days later.

Fortunately, many perforations are so minute as to be easily protected by the gallbladder, the under surface of the liver, the omentum or some other structure. Here, also, the chief symptom is pain. Unlike that of an unprotected perforation, however, the pain subsides or is relieved with opiates and the soreness gradually disappears. The patient often recovers without operation, though it is never wise to risk such a course, as the contents of the cavity may escape above the liver, producing a subphrenic abscess. When such an abscess does develop, adequate drainage should be established without delay. Again, the patient with a protected perforation may have persistent symptoms of obstruction incident to edema or de-

formity of the duodenum at the ulcer site. In such cases, surgery becomes necessary in order to overcome the obstruction.

Hemorrhage.—As a rule, bleeding duodenal ulcers are found on the posterior wall, penetrating into the head of the pancreas. The bleeding is produced by erosion of the blood vessels, usually of the pyloric group, and varies in extent according to the size of the vessels. It appears most often as melena, though it may be presented as hematemesis, or as both. The majority give rise to a mild but recurrent hemorrhage, with persistent pain, especially referred to the back as a consequence of the invasion of the pancreas, and a more or less severe inflammatory reaction with obstruction. Not infrequently, an anterior ulcer is likewise present, and occasionally one encounters an anterior ulcer which itself is hemorrhagic.

If the hemorrhage does not recur too often, the patient may be carried along indefinitely on medical treatment. We have limited surgery to those in whom hemorrhage occurs often or is associated with obstruction or *persistent pain*.

In the event of massive hemorrhage, the question of operation is somewhat more complicated. In younger individuals, that is, those under 45 years of age, a clot will usually form and close the opening. We feel that surgery is indicated only if transfusions and other supportive treatment fail to control the bleeding and raise the blood pressure to a satisfactory level within 36 to 48 hours. Especially is this true if the hemorrhage is the first evidence of ulcer and the patient has had no opportunity to try medical treatment. If the ulcer is of long standing, however, and medical measures have been given an adequate trial, we believe operation is advisable as soon as the patient sufficiently recovers from the effects of the hemorrhage. In any case, a second massive hemorrhage is a definite indication for surgical intervention.

Older persons, on the other hand, have less elastic arteries and the formation of a clot is less likely. In this group, it is best to operate within 12 to 24 hours unless continuous or repeated transfusions bring about a definite improvement; even so, operation should be performed as soon as possible following cessation of the hemorrhage. Reports of large series of cases have shown that operation for massive hemorrhage in individuals over 45 years of age carries a high mortality, especially if the procedure is delayed beyond the first 24 hours after onset. We have had no operative mortality in our small group of patients with massive hemorrhage, though one patient, a man aged 66, died of a recurrent hemorrhage while in the hospital being prepared for operation.

Obstruction.—Healed ulcers, usually situated on the anterior wall, often produce cicatrization and a chronic mechanical obstruction which can be relieved only by surgery. Patients with such ulcers give a history of constant or recurrent symptoms covering many years, and the majority have low acid values.

Not infrequently, a cicatrizing anterior ulcer is associated with a penetrating posterior lesion which also produces obstruction incident to inflammatory changes. In any case of obstruction, the presence of an anterior ulcer should lead one to suspect one on the posterior wall as well, whether indicated by the symptoms or not, and at operation to make a careful search to determine its presence. An ulcer on the posterior aspect is likely to be overlooked unless the pylorus is opened.

Intractability.—The outstanding feature of a large number of surgical ulcers is more or less severe and persistent pain or discomfort. The association of some degree of hemorrhage or obstruction, or both, is not uncommon. High acid values is the rule rather than the exception. The patient with such an ulcer is usually extremely nervous and is either incapable of being relieved by medical treatment, or incapable of following the required medical regimen. It has been our observation that the majority of intractable ulcers are multiple, the posterior one being the most active in producing symptoms.

Gastrojejunal Ulcer.—With few exceptions, this complication is observed in individuals with high acid values who have had a gastroenterostomy for duodenal or gastric ulcer. The incidence reported by different authors varies widely, from less than 2 per cent to 40 per cent. We have encountered a gastrojejunal ulcer at a second operation in approximately 8.5 per cent of patients for whom we performed the previous gastroenterostomy for duodenal ulcer. In addition, one patient has clinical and roentgenographic evidence of a gastrojejunal ulcer following a resection. The unfavorable result in this case was probably due to the fact that it was impossible to remove all the pylorus at the time of the operation. It is noteworthy, also, that in a total of 37 operations for recurrent ulcer, we have found a gastrojejunal lesion in 11, or 30 per cent.

The symptoms of gastrojejunal ulcer usually appear within a few weeks or months following operation. A distinction from duodenal ulcer may be made by the location of the pain, which is slightly lower and more to the left. Bleeding to some extent has been associated with a few of our cases.

Having found that medical treatment for gastrojejunal ulcer

gives only temporary relief, we regard operation as imperative as soon as the patient can be prepared. Frequently, also, the necessity for operation is increased by the association of an active duodenal ulcer. The ulcer should be removed, together with a portion of the stomach well above the gastroenterostomy stoma. In 2 cases, however, we have simply disconnected the gastroenterostomy, exploration having revealed no evidence of a previous duodenal or gastric ulcer at any time. Apparently, the gastroenterostomy had been performed in the absence of a demonstrable lesion.

The major consideration in undertaking early resection for gastrojejunal ulcer is the possibility of perforation into the peritoneal cavity, or, more likely, into the transverse colon. The outstanding symptoms of this catastrophe are diarrhea, belching of foul gas or vomiting of fecal matter, and excessive weight loss. As a consequence, the patient is usually in a state of severe dehydration, malnutrition and anemia, and is restored to an operable state with difficulty. In addition, the operation itself is often fraught with many obstacles because of dense adhesions and displacement of the involved portion of the intestines.

The risk of an extensive operation in the face of these conditions is of the first magnitude. Disconnection of the gastroenterostomy would obviously be preferable were it not for the danger of infection and the likelihood of a recurrent ulcer. We feel, therefore, that resection is the only sensible course, all things considered.

In order to minimize the risk in these cases, Marshall² has advocated a two stage procedure whereby an anastomosis is made between the terminal ileum and descending colon at the first stage, to divert the intestinal contents and prevent regurgitation into the stomach. After an interval of a few weeks, during which the patient is given intensive restorative treatment, the right colon is resected beyond the fistula, together with the involved segment of the jejunum and a generous amount of the stomach. Two of 14 of his patients who were operated upon by this method did not require the second stage. The operative mortality in the group was 7.1 per cent.

Marshall's procedure, or a two-stage operation wherein a colostomy is made proximal to the fistula prior to resection, as advocated by Pfeiffer,³ would seem to be a reasonable approach to this serious problem. In the hands of the skilled surgeon, either should offer a better prospect of a successful outcome than one-stage resection.

Of the 11 patients for whom we performed a resection for gastrojejunal ulcer, 2 or approximately 18 per cent, had a gastrojejunocolic fistula. In both cases, the fistula was closed and a subtotal

gastrectomy performed. One of the patients is living and well, 6 years after the operation. The other, whose fistula had been present for 6 months, died of pneumonia following operation. This was our only fatality in the group with gastrojejunal ulcer.

For all except acutely perforating ulcers, the operation generally employed for duodenal ulcer is partial or subtotal gastrectomy. The object of resection is control of the acid factor, and whether the ulcer is of the hemorrhagic, obstructive or intractable type, thus far this procedure best insures the patient against further difficulty.

There are, however, cases in which one should be content with gastroenterostomy. One of these is presented by patients beyond middle age with cicatrizing, obstructing ulcers, who are in a state of malnutrition and dehydration from persistent vomiting over a long period of time. Much of the danger of operation may be avoided by active preparation with transfusions, proteins, vitamins and parenteral fluids, though intercurrent disease often adds to the gravity of the situation. If the stoma is made sufficiently wide, gastroenterostomy is followed by prompt relief and the patient soon regains normal weight and strength. Fortunately, the majority of such patients have low acid values and the relief is then generally permanent.

Gastroenterostomy is also preferable when the inflammatory reaction is so extensive as to preclude safe dissection, or if the ulcer is situated so far distally that liberation of the duodenum is impossible without endangering the common duct or other adjacent structures.

Recently, Dragstedt¹ has offered an alternative to partial gastrectomy in section of the vagus nerve. He points out that the chief secretory abnormality in ulcer patients lies in the secretion of excessive amounts of gastric juice in the interval between meals, particularly at night when the stomach is empty and there is no obvious stimulant. Further, the medical management of duodenal ulcer has been successful in proportion to the degree to which the acid gastric juice has been neutralized during the entire 24 hours. Likewise, the success of surgical treatment depends upon removal of a sufficient portion of the fundus mucosa to reduce the gastric secretion to normal or subnormal values.

On the premise that gastric secretion is influenced by neurogenic as well as humoral factors, Dragstedt divided the vagus nerves to the stomach in a group of dogs and found that secretion of the gastric juice fell to one-half or one-fourth of the normal level. Subsequent use of vagotomy in 39 patients with duodenal, gastric and gastrojejunal ulcers was followed by a reduction of gastric

secretion at night from 50 to 60 per cent, with gratifying symptomatic relief, especially in the cases of duodenal and gastric ulcer. From these experiences, it would seem that vagotomy holds a definite promise, and we shall welcome with interest reports on further studies along this line.

In the matter of resection, we formerly employed the posterior anastomosis in the majority of cases. We found, however, that the anterior anastomosis is executed more easily and are now employing this method almost routinely. It is particularly valuable in performing high resections.

We have preferred the Polya to the Hoffmeister type of anastomosis, believing that this procedure better eliminates the acid factor by permitting more rapid emptying of the stomach and thus limiting the admixture of acid with the contents. Further, the maximum amount of bile is admitted into the stomach through the larger opening. During the early postoperative period, too rapid emptying is prevented by spastic contracture of the jejunum, and after healing is complete the jejunum acquires a certain immunity to the stomach acids and itself assumes some degree of digestive function. In addition, obstruction incident to adhesions or to contracture of the stoma from scar tissue is less likely following these procedures.

Since it is almost universally accepted that the stomach cannot be rendered completely achlorhydric by even subtotal gastrectomy, it is probable that we have gone a little too far in this respect. There is so little difference in acid values following resection of 50 and 75 per cent of the stomach, that we are inclined to favor the former for the reason that it gives better stomach function. Further, one must consider the possibility of reformation of an ulcer; in such an event, a second operation is much more readily consummated if the first has not been too radical.

For the average patient, we resect 50 to 65 per cent of the stomach. Only in the presence of excessive acids or a severe gastritis do we remove more than two-thirds. A recurrent or marginal ulcer, however, demands a more extensive resection, i.e., 75 to 80 per cent, and even so, the patient is likely to remain comfortable after operation only by following a medical regimen for an indefinite time.

A review of over 1500 cases of duodenal ulcer observed during the past 30 years disclosed the fact that now, no less than two decades ago, approximately 30 per cent of these patients come to operation. Since we have been more exacting in the selection of cases for surgery in later years, this continued high percentage in-

dicates that we are seeing more patients with the type of ulcer which requires operation.

Within recent years, we have followed the general trend toward resection in our choice of operation. To illustrate this changed conception, the surgical ulcers encountered during the past 30 years have been divided into two series: those observed prior to 1932, and again, since that time, the total number having been 445. (Table I.)

TABLE I

OPERATIONS IN 445 CASES OF COMPLICATED DUODENAL ULCER—January, 1918-April, 1946

	Closure Perforation	Pyloro- plasty	Gastro- enterostomy	Disconnection Gastroenteros- tomy for G.J.U.	Resection	Total
<i>Group I</i>						
600 Cases	22	35	144	0	2	173
1/1/18-1/1/32						
<i>Group II</i>						
915 Cases	36	14	89	2	131	272
1/1/32-4/1/46						
TOTALS	58	49	203	2	133	445

The 131 resections in the second group constitute approximately 48 per cent of the entire 272 operations.

It should be stated that we have not performed a pyloroplasty in our clinic since 1939, and in that year performed only one. Further, in 1940, the number of our resections for primary ulcer was twice that of our gastroenterostomies, whereas today four-fifths of our operations for primary duodenal ulcer are resections. Not only have the indications for this procedure been broadened, but it has been made possible in a larger number of cases by improved pre-operative therapy.

Of the 131 resections performed during the past 14 years, 94 were for primary ulcer. The complications which necessitated operation are shown in their respective proportions.

TABLE II

 SURGICAL COMPLICATIONS IN 94 CASES OF PRIMARY
DUODENAL ULCER

Hemorrhage (20 multiple)	39 (40%)
Obstruction (3 multiple)	19 (20%)
Intractability (24 multiple)	36 (40%)
TOTAL (47 multiple)	<hr/> 94

It will be observed that hemorrhage was associated with approximately 40 per cent of the ulcers and obstruction with 20 per cent, while the remaining 40 per cent were regarded as intractable. Of the hemorrhagic ulcers, approximately 50 per cent were multiple; of the obstructive, 16 per cent, and of the intractable ulcers, 60 per cent.

It has been our experience, in common with that of other surgeons, that obstructive ulcers of the duodenum are most amenable to cure by resection, the next best results following resection for bleeding ulcers, and the prospect of relief in the intractable group being somewhat less favorable. Only about 60 per cent of our patients with intractable ulcers have been entirely relieved of their symptoms, and an additional 20 per cent partially relieved.

In addition to these 94 resections for primary duodenal ulcer, we have performed resection for secondary or recurrent duodenal ulcer in 26, and for gastrojejunal ulcer in 11 cases. The findings and mortality of the entire 131 cases are shown in Table III.

TABLE III

 FINDINGS AND MORTALITY IN 131 GASTRIC RESECTIONS
FOR COMPLICATED DUODENAL ULCER

	Number	Mortality	Per Cent
Duodenal Ulcer, primary (8 with Gastric Ulcer)	94	3	3.2
Duodenal Ulcer, recurrent (2 with Gastric Ulcer)	26	1	4
Gastrojejunal Ulcer (2 with Colon Fistula)	11	1	9
TOTALS	<hr/> 131	<hr/> 5	<hr/> 3.8

As will be seen, there were 3 postoperative fatalities in the primary group and 2 in the secondary group. One of the 3 opera-

tions in the first group was performed 13 years ago, death being due to pneumonia. The other two fatalities followed resections performed within the past 10 months. In one of these, coronary occlusion was the immediate cause of death; in the other, the patient apparently succumbed to the effects of an acute pancreatitis with fat necrosis and infection, as shown by autopsy. It is possible that the latter patient would have survived a gastroenterostomy, though resection was performed because of a large penetrating and obstructing posterior ulcer with a perforated, protected anterior lesion. This is one case, moreover, wherein we feel that medical treatment was overdone. The patient had persistently refused operation, despite the fact that he had been on a medical regimen almost constantly over a period of 12 years.

Of the remaining 91 patients who had a partial gastrectomy for primary ulcer, 89 have been followed. Of these 89, one, mentioned previously, has clinical and roentgenographic evidence of a gastrojejunal ulcer, and two others have obtained no relief from the operation. In each of the three cases, the symptoms returned within 3 weeks to 3 months following operation. These 3 constitute 3.4 per cent of the 89 cases. Nineteen of the 89 resections have been performed within less than a year. Excluding the 3 patients whose operations may be regarded as failures, approximately 70 per cent have obtained complete relief, with good stomach function. Another 10 per cent have been partially relieved but continue to complain of mild nausea and vomiting after breakfast, or some weakness or inability to gain weight.

One of the two fatalities in the secondary group was that of a patient, aged 71, who had a reactivated perforating duodenal ulcer following two gastroenterostomies performed elsewhere. The patient died of an acute heart attack on the tenth postoperative day. The other patient was the one mentioned above with a gastrojejunal fistula of six months' duration.

Aside from these two deaths, the resections for recurrent or reactivated ulcer have been uniformly successful. One or two patients have complained of a slight nausea after breakfast, but otherwise, all have obtained good function and excellent symptomatic results.

The 37 patients who had a resection for recurrent ulcer constitute 28 per cent of the total of 131 patients for whom the operation was performed and approximately 14 per cent of the entire 272 with surgical duodenal ulcers. This may be compared with 3.4 per cent who have clinical evidence of a recurrence subsequent to partial gastrectomy.

DISCUSSION

From our experience, as well as from the reported experiences of other surgeons, there is still need for improvement in the results of surgical treatment of duodenal ulcer. Especially is this true in view of the fact that the incidence of ulcer is increasing and that more patients are requiring operation.

A more thoughtful selection of patients for surgery may offer one means of improving our results. To make a diagnosis of ulcer is one thing; to know when to operate is quite another. A simple ulcer requires no surgery, but an ulcer which continues to incapacitate the patient over a period of years is no simple ulcer. To persist in delaying operation in such cases is as unsound in principle as to operate without adequate justification. Two cases reported herein illustrate this point.

Another important consideration, once surgery becomes necessary, is the choice of the operation. The immediate urgency of saving the patient's life in the presence of an unprotected perforation calls for nothing more, in our opinion, than closure of the perforation. The ultimate result is a secondary consideration, though about 50 per cent of our patients who have had closure alone have required subsequent operative treatment.

In other cases, it may be that vagotomy will come to have a wide application. Until then, the choice lies between gastroenterostomy and resection.

The results of gastroenterostomy routinely applied proved years ago that this operation was not suitable for all duodenal ulcers. As a consequence, resection was received with such wide enthusiasm as to have been to some extent overdone. This is the way with all new surgical procedures. With time and experience, however, an equilibrium is reached, their faults and virtues being revealed in a true light. We believe this is now true of gastroenterostomy and gastric resection for duodenal ulcer. We have found that gastroenterostomy, though limited in application, is unquestionably a valuable operation in properly selected cases. It is a surgical makeshift, but is safer than resection and the symptomatic results are often excellent. Resection, on the other hand, offers better protection against recurrent ulcer, and for this reason is preferable to gastroenterostomy when feasible. We are finding, however, that resection may be too extensive. Experience has shown that, in the average case, removal of 75 to 90 per cent of the stomach is both unnecessary and unwise. Removal of 50 to 65 per cent is equally curative and at the same time better preserves stomach function.

Until some safer and more effective treatment is brought forward, our hope of improved results in the surgical treatment of duodenal ulcer seems to lie largely in observance of these two points: (1) when employed discriminately, gastroenterostomy is an excellent operation, and (2) in performing resection, aside from the exceptional case, it is desirable that only a moderate amount of the stomach be removed.

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REGIONAL ENTERITIS

A Report of a Case Complicating Pregnancy with a Review of the Literature

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TO ASSUME that regional enteritis existed prior to the original and classical report by Crohn, Ginzburg, and Oppenheimer¹ in 1932 is not a mere conjecture. The lesion was described in the medical literature prior to that time, grouped under the large and general heading of "benign intestinal granulomata." To illustrate, in 1828 Abercrombie² wrote of a 13 year old girl who, after suffering for about one year before her death, was found at autopsy to have 18 inches of terminal ileum "distended, thickened in its coats, externally of a reddish color, and internally covered by numerous well-defined ulcers, varying in size from the diameter of a split pea to that of a sixpence." Other writers, puzzled as to classification and hardly cognizant of the clinical and pathologic manifolds of the disease, reported suggestive cases in other departments of the medical literature. Even Crohn,³ the man accredited for the original recognition and description of the condition, admits having reported one of his first cases as an atypical case of brucellosis manifesting continued fever associated with intestinal symptoms.

During the past 12 years a multitude of cases have been reported by many authors. A number of synonymous names have made their appearance (regional ileitis, ileojeunitis, segmental ileitis, Crohn's disease, non-specific granuloma, phlegmonous enteritis, regional enteritis, etc.) and have caused confusion in the terminology. The writers prefer the nomenclature of Rosser,⁴ that of "regional enteritis," in view of the fact that the disease often affects the colon as well as the terminal small bowel. Crohn⁵ has dismissed the nomenclature by stating, "But with all its various names the disease remains the same: namely, a non-specific, granulomatous, ulcerative condition beginning in the submucosa and infiltrating the mucosa with granulating, cicatrizing tissue."

Regional enteritis is not a common condition. Yet the diagnostician may find himself in error should he term it a rare disease and think lightly of it when making a differential diagnosis. Bockus⁶ states that it is the most common chronic inflammatory lesion pri-

marily affecting the mesenteric small intestine of persons in the United States. In his recent review of the literature on this subject published between 1939 and 1943 he found 160 papers listed in the literature. Shapiro⁷ uncovered 519 operative cases reported by 1939. Crohn⁸ observed the disease to respect no particular geographical location but to enjoy a higher incidence in young people of the male sex, 27 being the average age of occurrence.

Its etiology remains unknown. Bockus states that there is nothing to suggest that a virus is causative. Neither does he believe that sufficient evidence is at hand to incriminate an animal parasite as the initiating factor. Erskine⁹ thinks that the primary site of involvement lies in the regional lymph nodes, the mesentery and ileum being secondarily involved as a result of inadequate lymphatic drainage with stasis of infected lymph in the dilated lymphatic channels of the terminal ileum. Jackson⁹ believes the disease is probably a disease of the lymphatic system somewhat akin to the common clinical entity of mesenteric lymphadenitis. Other postulates of etiology include food poisoning, bacterial invasion, focal infections, allergy, and even psychosomatic disturbances with special reference to emotional unrest. It is obvious there is no unanimity of opinion.

Little has been added to the clinical picture of regional enteritis since it was described so adequately by Crohn, Ginzburg, and Oppenheimer in their original paper. They describe the disease in its four clinical stages: (1) the stage of inflammation, (2) the stage of ulceration, (3) the stage of cicatrization and stenosis, and (4) the stage of fistulae formation and/or abscess formation.

STAGE 1: This stage simulates an intra-abdominal inflammatory process, namely, acute and subacute appendicitis. It is heralded by tormina, fever, leukocytosis, and occasionally nausea and vomiting, commonly localizing with or without a palpable mass in the right lower quadrant of the abdomen. Jackson states that the most typical picture is that of a young adult with acute colic-like abdominal pain, usually occurring one or two hours after eating and accompanied by nausea and vomiting.

STAGE 2: This stage often mimics ulcerative colitis and manifests mainly crampy abdominal pain, diarrhea often tinged with bloody mucus, malaise, fatigability, weight loss, low-grade unexplained fever, and anemia.

STAGE 3. By this time a palpable mass is usually present in the right lower quadrant of the abdomen, and the patient often experiences recurrent exacerbations of intestinal ileus with all the signs and symptoms accompanying that condition. Chemical imbalance as a result of recurring partial or complete obstruction of the bowel makes its appearance and contributes to the already progressing debilitated state.

STAGE 4. This is the late stage of the disease and is identified by perforation of the diseased bowel, usually at the site of its mesenteric attachment, with subsequent formation of fistulae and/or intra-abdominal abscesses. The fistulae

may be internal and connecting adjacent loops of bowel, external between a loop of bowel and a cutaneous surface, or combinations of these two varieties.

These stages are not clear-cut and well defined in view of the fact that this malady is a chronic and progressive disease. Lyon and Bartle¹⁰ point out that it is small wonder that this disease has gone for so many years without recognition, for there are no outstanding and constant symptoms or group of symptoms connoting it as an entity. Mazel¹¹ does not feel that regional enteritis should be called a clinical entity and observes that it is seldom diagnosed properly. He prefers to call it a pathologic entity. However, this disease as an entity, be it clinical or pathologic as individually preferred, should not be dismissed from the differential diagnosis in possible cases until the diagnostic acumen of both the clinician and the roentgenologist has been exhausted; even then it should not be forgotten completely until its absence has been proved by laparotomy if such a procedure is deemed advisable and necessary for diagnosis.

An accurate evaluation and diagnosis of roentgenograms, including barium meal and barium enema studies, require the attention and the skill of a competent roentgenologist. The cicatrizing stage (stage 3) is apt to be revealed by the "string sign of Kantor" in the form of a small ribbon of barium in the stenosed terminal ileum. Other suggestive roentgenographic signs include dilatation of the ileal loops immediately proximal to the lesion or a filling defect proximal to the cecum. Fluoroscopy often shows delayed peristaltic movements in the involved area of bowel. Appendicitis, appendiceal abscess, mesenteric lymphadenitis, ileocecal Koch's disease, abdominal neoplasm, ulcerative colitis, and actinomycosis are the main diseases to be considered in the realm of differential diagnosis of regional enteritis.

Pathologically the disease represents a rather typical picture. The bizarre feature of the disease is its lack of uniformity in its contiguous spread; as Crohn⁵ says, "One of the pathognomonic signs of the disease is its tendency to be discontinuous with extensive portions of apparently normal bowel interspaced between the pathologically involved segments." These regions he has named "skip areas." Usually the pathology is found in the terminal 6 to 12 inches of the ileum with a tendency to extension both orally and rectally. The involved bowel is thickened by hypertrophy of its walls, hyperplasia of the mucosa, and lymphedema of the involved segment and its mesentery. The color varies from a dark pink to a maroon color, and the consistency of the bowel has been described as being comparable to a section of soggy rubber garden hose. The peritoneal surface presents a fine granular appearance, and on sec-

tion of the bowel the lumen is found to be narrowed and the mucosa covered by focal areas of hyperplasia. Ulceration may be seen. Evidence of lymphangitis and adenitis with lymphadenomegaly can be demonstrated in the mesentery. Indurated abscesses and/or digestive fistulous tracts are frequently encountered, commonly in the retrocecal space. Microscopically the acute stage shows edema and acute inflammatory exudative cells. Later, in the chronic stages, all of the bowel coats become infiltrated with fibrous tissue, round and epithelioid cells, and giant cells. The microscopy reveals a cellular reaction which resembles tuberculous follicle formation but without evidence of caseation necrosis.

The treatment of regional enteritis is unquestionably surgical. Several methods have found favor in the hands of various surgeons. However, a set of principles with respect to surgical judgment can well be followed to advantage. For the case in which the abdomen is opened in the acute stage it seems to be generally agreed that it is best to follow the time-honored maxim of letting the sleeping dog lie by dropping the diseased bowel back into the abdominal cavity and closing without drainage. Cave¹² warns that appendectomy during the early stage, or for that matter during any stage, only invites disaster. As soon as the acute exacerbation has subsided to a sufficient degree, but before the stage of ulceration has made its appearance, the surgeon should return to the field and perform an exclusion operation in the form of an ileotransverse colostomy with transection of the ileum. Cave believes that many cases are permanently cured in this manner. Cases reaching the stages of ulceration, stenosis, and fistulae formation will require further surgery in the form of resection before they are cured. Regardless of the method used, all "skip lesions" should be removed. Garlock and Crohn¹³ appraised the results of surgical treatment used in 164 cases which were followed carefully during a period of twelve years. Fifty-five of these cases were treated with primary resection, and there was an incidence of 9 postoperative deaths (16.3 per cent). Nine of the remaining 46 had recurrences (19.5 per cent). There was no incidence of late mortality. In the 65 cases treated with ileotransverse colostomy or ileosigmoidostomy with transection of the ileum there were no postoperative deaths and only 9 (13.8 per cent) had recurrences. Twenty-five cases had two-stage ileocolic resections with a 12 per cent operative mortality and a 36.3 per cent recurrence rate. The over-all mortality in the 164 cases reviewed was 8.5 per cent. On the basis of this review, they recommend short-circuiting procedures in preference to primary resection or two-stage resections. Most workers have found chemotherapy of little avail in treating this disease. Nevertheless, Mazel recommends

heavy doses of sulfasuxidine and penicillin in the pre- and post-operative care of these patients. He reports a single case treated with sulfasuxidine and penicillin alone and compares it with his surgically treated cases as having obtained equally good results.

Prognostication with respect to cure in regional enteritis should be guarded. According to Garlock and Crohn, once the immediate risk of surgery has been overcome, life itself is assured, although physiologic intestinal function, weight gain, strength, and efficiency may be impaired.

REPORT OF CASE

Mrs. I. U., a primigravida aged 23, was admitted to the Methodist Hospital, March 25, 1946 during her thirty-third week of gestation with a complaint of crampy abdominal pain.

The patient had suffered from the usual childhood diseases; she also had had diphtheria and scarlet fever. The latter had been followed by otitis media. In March, 1943 she had been operated upon for a rectal abscess.

The pregnancy had been uneventful until the twenty-eighth week of gestation, at which time she had complained of attacks of "upset stomach"; during the thirtieth week she had had several attacks of crampy abdominal pain, but each attack had subsided promptly without any medication.

During the subsequent two-week period the patient had complained of progressively increasing symptoms, principally in the form of backache—which was intensified in the upper lumbar regions immediately below the costal margins bilaterally—nausea and vomiting, qualitative dyspepsia with a general diminution of the appetite, and bloating of the abdomen with gas. She had been running a low-grade fever of about 100° F. She had complained of severe, cramp-like epigastric pain and had been extremely restless. She had been partaking only of soft foods and had not been tolerating even these very well. It had been difficult for her to swallow, food sticking in her throat. At this time it had been thought the patient was suffering from cardiospasm, and she had been treated accordingly.

On admission to the Methodist Hospital she was still complaining predominantly of crampy abdominal pain, and the upper part of her abdomen was distended and tympanitic. A positive admission diagnosis of a seven months' pregnancy and a tentative diagnosis of partial intestinal obstruction was made. The pain was sufficiently intense to justify the use of demerol hydrochloride (50 mg.) by hypodermic for analgesia. Because she appeared somewhat dehydrated 1,000 c.c. of 5 per cent dextrose in physiologic saline solution was administered by continuous intravenous drip. The laboratory report showed a red blood count of 4,720,000, a white blood count of 10,550, and a hemoglobin of 65 per cent. A catheterized urinalysis was normal except for occasional blood, pus, and epithelial cells. The Rh factor was found to be positive.

On the day following admission the patient's condition was essentially unchanged, but examination showed some tenderness to palpation in the region of the right kidney. The fetal heart sounds were heard clearly in the left lower quadrant and were found to be regular but rapid (160 per minute). Her temperature was 99.2 F. An enema was productive of good results, and

the returning stool appeared normal. Later in the evening the patient vomited some greenish mucoid material, and the abdomen was still tympanitic. Another 1,000 c.c. of 5 per cent dextrose in saline was given at this time. A flat plate x-ray of the abdomen showed a normal fetal skeleton of about seven months' gestation with the head presenting at the pelvic inlet but not engaged. No



Fig. 1. Barium enema: Shows distortion of the cecum with finger-like extensions into the lumen.

abnormalities of the fetus or the maternal skeleton were noted. The roentgenologist was of the opinion that there was no intestinal obstruction. X-ray of the chest showed no gross evidence of a pulmonary lesion. Four days after admission to the hospital she began to have sharp, shooting pains in her back and abdomen, her membranes ruptured, and she had a bloody show. After an uneventful labor of eight hours and forty-eight minutes' duration she delivered a 5 week premature infant which appeared normal in every respect. She received the usual routine care during labor and the immediate puerperium.

For two days postpartum the patient's condition was entirely satisfactory. On the third day it was noted that she was again beginning to have a low grade temperature ranging from 99 to 101° F. By the fifth postpartum day the patient was complaining of severe cramp-like abdominal pain which was difficult to localize subjectively. Examination at this time revealed a mass the size of a small grapefruit lying between the costal margin and iliac crest in the right side of her abdomen. The mass was not tender and was slightly movable but moderately firm in consistency. Rectal examination revealed normal uterine involution and no palpable masses in the pelvis. Pelvic examination found the uterus in the midline and anterior, and it seemed to be entirely separate from

the mass in the right lower quadrant. Urologic x-ray studies including pyelograms showed the urinary tract to be normal. X-ray films revealed dilatation of the ileal loops in the left side of the abdomen. It was concluded that the films showed evidence of a low-grade partial obstruction of the small bowel.

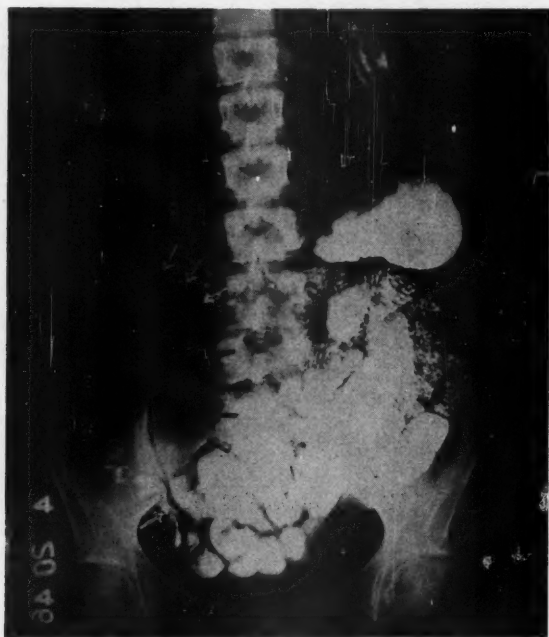


Fig. 2. Barium meal: Displacement of ileal loops to the left by the mass in the right lower quadrant. Note jagged, stenosed terminal ileum over the right sacroileal joint.

The patient was beginning to show evidence of weight loss, and her skin was becoming extremely pale. Blood studies revealed a red blood cell count of 2,550,000 and hemoglobin of 45 per cent. She was transfused with 500 c.c. of whole blood and placed on ferrous sulfate, 5 grains three times daily. Agglutination tests for *B. abortus*, *B. tularensis*, paratyphoid, and typhoid were negative. A blood culture was negative.

The patient's symptoms seemed to be growing progressively more severe and were characterized by intermittent exacerbations. By the tenth postpartum day the pain was so severe that pantopon, 1/3 grain, was required to give relief. The temperature rose to 103.8° F. She was given sulfadiazine in the usual therapeutic course of 3 Gm. at once followed by 1 Gm. every 4 hours. Sodium bicarbonate was given, gram for gram, with the sulfadiazine. She received another transfusion of 500 c.c. of whole blood to improve her blood picture and general state of well-being. Roentgenographic studies of the biliary system revealed a non-functioning gallbladder. Retrograde pyelographic studies were negative.

The patient's condition was not improved by sulfadiazine therapy. In view of the grapefruit-sized abdominal mass, progressive symptoms of chronic recurring ileus, fever, crampy abdominal pain, anemia, and general debility, it was believed that we were dealing primarily with a surgical problem, and on the eighteenth postpartum day Dr. James A. Jackson was called in to see the patient. After a thorough review of the patient's history and a careful physical



Fig. 3. Note the thickened edematous wall.

examination, he concluded there was a pathologic process involving the terminal ileum, the cecum, and part of the ascending colon; the most likely diagnosis seemed to be that of a carcinomatous lesion of the cecum. The other components of differential diagnosis at this time were (in order of their relative importance): (1) ileocecal granuloma (ileocecal Koch's disease or regional enteritis), (2) retroperitoneal sarcoma, and (3) pedunculated tumor of pelvic origin.

A barium enema revealed a narrowing of the ascending colon or upper cecum with encroachment from the medial side. The tumor mass appeared to send finger-like extensions into the lumen, and the left border of the cecum was jagged and irregular (fig. 1). It was not possible manually to displace this section of bowel. The conclusion was that there was present in the right lower quadrant a mass involving the cecum with x-ray evidence definitely favoring malignancy. On examination after the administration of a barium meal, the barium head was seen to be advanced to the splenic flexure of the colon. A loop of ileum partially outlined the mass in the right lower quadrant, and this loop seemed to have a pathologic connection with the ascending colon, that is, a fistulous tract. An earlier film did not show the terminal ileum with certainty. Overlying the midportion of the right sacroiliac joint there was a column of barium which appeared to be the terminal ileum; the outline was ragged. Also, the ileal loops were displaced to the left by the mass in the right lower quadrant (fig. 2). The cecum was not well outlined. The primary

impression was carcinoma of the cecum, and, secondarily of consideration, a retroperitoneal tumor or other tumor, possibly lymphosarcoma, arising from the root of the mesentery.

It was decided the patient should be submitted to an abdominal laparotomy.



Fig. 4. Note the fistulous tracts.

Preoperative care included bleeding and clotting time determinations and sulfasuxidization with 2 Gm. every 2 hours for 24 hours, then 1 Gm. every 2 hours for 48 hours prior to surgery; she was placed on a high protein, high carbohydrate, and high caloric diet. This diet was continued until 18 hours before surgery, when she was placed on a soft diet, which was continued until 6 p. m. on the evening before operation. After this she received nothing by mouth. Blood typing and cross-matching were done, and a colonic flushing was given the evening before operation to cleanse the bowel in view of the probability of resection.

One and one-half hours after preanesthetic medication with pantopon and nembutal the patient was taken to the operating room and prepared with continuous spinal anesthesia, novocaine being the anesthetic agent. The abdomen was opened by a right rectus incision. The terminal ileum, the cecum, and part of the ascending colon displayed the offending pathology. This portion of the alimentary canal was found to be exceedingly edematous (fig. 3) and of a maroon color very much like that described for regional enteritis. The terminal small bowel had the consistency of a piece of soggy rubber garden hose, and the peritoneal surface showed a peculiar fine granular appearance. The region of the ileocecal valve was markedly distorted, with fistulous tracts and a firm indurated mass behind it extending retroperitoneally into the retrocecal space (fig. 4). Entertaining the thought that here we were in all probability dealing with a form of regional enteritis but still retaining a strong suspicion that the condition was malignant, a primary resection of about 10 inches of the terminal ileum, together with the cecum and 6 inches of the ascending colon, was performed by Dr. Jackson. An ileocolostomy was

effected by affixing the transected ileum to the remaining stump of the ascending colon by an end-to-side anastomosis. The denuded peritoneal surface was covered, the bowel was dropped back into place, and the abdomen was closed without drainage.

The removed portion of the digestive tract was sent to the pathologist for examination and a report of regional enteritis was returned.

The patient's immediate postoperative course was somewhat stormy. Upon her return to her room she was transfused with 500 c.c. of whole blood. Wangenstein suction was installed, and she was provided with 3,000 c.c. of fluids daily by the parenteral route. Penicillin was started in amounts of 200,000 Oxford units a day. Later, amigen and blood were given to insure adequate blood protein levels and thus to promote rapid healing. Her temperature rose to 103.8 F. the day following surgery, but it gradually leveled to normal by the fifth postoperative day. Thereafter she made an uneventful recovery.

COMMENT

Review of the *Cumulative Index Medicus* reveals that heretofore there has been no report in the medical literature of regional enteritis complicating pregnancy. In this paper we present a case which became initially symptomatic at the period of viability and passed successively through the four classical stages of the disease. Normal spontaneous delivery occurred five weeks prematurely; the patient was treated successfully on the twenty-second postpartum day by primary resection of the diseased portion of bowel and subsequently made an uneventful recovery.

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THE SIGNIFICANCE OF CHRONIC URETHRITIS IN WOMEN

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CHRONIC nonspecific infection of the female urethra is more common than generally recognized and frequently is completely overlooked as a cause of many acute and chronic urinary symptoms. It is our experience that nonspecific infections of the urethra are encountered more often in the female than in the male. The term granular urethritis has been applied to a group of pathologic inflammatory changes in the urethra and vesical trigone which appear granular on inspection and which produce urinary symptoms, some of which are easily explained, and a multitude of others the cause of which is often misleading. Chronic urethritis should be considered as a possible source of trouble in dealing with any obscure abdominal condition below the level of the umbilicus.

It is the purpose of this communication to call attention to the significance of chronic urethritis in the production of many urinary symptoms in women and to present our findings from an analysis of 100 cases.

ETIOLOGY

Although the exact cause of chronic urethritis in women is not completely understood, there are a number of factors which play either a direct or an indirect role. The histologic anatomy of the female urethra and the relationship of the urethra and trigone to the female reproductive organs appear as strong predisposing factors to the invasion of disease. The urethra is a short, tubular structure, about 4 cm. in length, which opens by the external urethral orifice in the roof of the vestibule. It is lined with squamous epithelium in its outer two-thirds and with transitional epithelium which merges with that of the trigone in its inner third. In addition to the para-urethral glands of Skene opening on either side of the external urethral orifice, there are numerous urethral glands which open into the lumen of the canal. Opening as it does in the vaginal vestibule, the external meatus is constantly bathed in normal

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secretions that come from the cervix and glands around the vaginal orifice which contain a variety of bacteria. Carelessness in vulvar hygiene, chronic endocervicitis, pyelonephritis, masturbation, application of radium to the cervix, coitus, obstetrical trauma and pre-operative and postoperative catheterization are all forerunners of urethral infection.

An analysis of our series of cases showed that 87 per cent of the patients were married and 9 per cent widowed, or a total of 96 per cent who had had sexual intercourse, emphasizing trauma during intercourse as a possible etiologic factor. This unquestionably is the exciting cause of the so-called defloration cystitis and pyelonephritis. Eighty-six per cent of these patients had borne one or more children.

Winsbury-White¹ in 1933 reported the results of animal experiments which appeared to show a direct lymphatic communication between the cervix uteri and the posterior urethra and trigone, as well as the upper urinary tract, so that urethritis and trigonitis could by direct lymphatic extension come from an infected cervix. Hunner,² in 1911 emphasized the role of distant foci of infection in the etiology of urethral pathologic conditions. The belief was that infected teeth, tonsils, paranasal sinuses and perhaps lesions of the gastrointestinal tract might produce nonspecific urethritis. Although he gave an accurate description of the symptoms, findings and treatment of urethritis, 20 years elapsed before its importance became fully recognized.

PATHOLOGY

The inflammatory changes from chronic urethritis are limited chiefly to the posterior third of the urethra, the bladder neck and a trigone. The urethral mucosa has very much the same appearance as the granulation tissue seen under endoscopic view of chronic posterior urethritis in the male. Frequently, the mucosa at the bladder neck is irregular and interrupted by small cysts or polyps. These vary from short, oval cysts containing clear fluid to polyps with long flowing fronds. The latter resemble the fronds of bladder papillomas. The trigone is also frequently covered by these small cysts in conjunction with the picture of trigonitis. It is believed that this marked congestion and inflammation of the trigone is due to sub-trigonal lymphangitis. The polypoid masses of tissue are often just within the grasp of the internal sphincter which explains why they may cause such troublesome symptoms. In cases of long standing infection cicatricial contracture of the urethra may produce

enough obstruction to cause changes in the bladder similar to those seen in incomplete obstruction at the bladder neck in the male.

It is not my purpose to discuss here whether or not the female urethra possesses a rudimentary prostate; nevertheless, it has been shown by Folsom³ and others that some females do have glands in the posterior urethra. A study of pathologic sections of tissue removed from the bladder neck in our own cases has also shown the presence of such glands. In one of our recent cases the section was reported as chronic prostatitis until it was noted by the pathologist that the subject was a female. A careful comparison of these sections with those of chronic prostatitis showed them to be almost indistinguishable.

SYMPTOMS

The complaints encountered in 100 patients whose only diagnosis was granular urethritis were analyzed. The two outstanding symptoms produced by chronic urethritis were bladder irritation and pain. Ninety per cent of the patients in our series complained of nocturia, which varied in frequency from 2 to 15 times and in many cases afforded little opportunity for sleep. Diurnal frequency was noted in 86 per cent of cases and in 10 cases it was more troublesome in the morning than during the rest of the day. Burning was experienced in 82 per cent of cases; urgency, 39 per cent; a feeling of pressure in the bladder, 38 per cent; and hematuria, 19 per cent. Stress incontinence, which was a complaint in 19 per cent of cases, is, from the patients' standpoint, a most annoying symptom because they lose enough urine to wet the clothing merely by coughing, sneezing or straining. Straining to urinate was reported by 10 per cent of the patients. *Pain* was noted in the suprapubic area, right and left lower quadrants of the abdomen, both lumbar areas, sacral region, labia and insides of the thighs. Sixty-eight per cent of the patients in our series had been subjected to some form of lower abdominal operation. From an analysis of this group, it was apparent that in the majority of cases the operation was clearly indicated as evidenced by the findings at operation. Others were apparently operated upon for the referred pain originating in the inflamed urethra as indicated by the fact that their symptoms were not relieved by operation but were promptly alleviated by treatment to the urethra. Some dated the onset of symptoms from postoperative catheterization. Nine patients in this group had received radium application to the cervix. These patients, as might be expected, responded slowly to treatment. Of the 22 patients who had no previous surgical treatment 75 per cent gave a history of a preceding

attack of cystitis or pyelonephritis. It was impossible to determine, however, whether or not some of these symptoms had been previous attacks of urethritis.

DIAGNOSIS

The diagnosis of chronic urethritis in women is not difficult. On the passage of a catheter, the urethra will be found abnormally sensitive. The urine specimen collected through the catheter should be subjected to both chemical and microscopic study. In 95 per cent of our cases urinalysis yielded negative findings. This, perhaps more than anything else, accounts for the fact that in so many of these cases the diagnosis is missed. While the catheter is in place, the capacity of the bladder should be determined and the bladder thoroughly lavaged with a solution of 1:8000 potassium permanganate or any other nonirritating antiseptic as a safeguard against the introduction of infection.

The bladder and urethra should then be studied with a panendoscope or a close vision cysto-urethroscope. The vault, walls, ureteral orifices, trigone, internal sphincteric area and the urethra should be carefully examined for pathologic changes. The mucosa of the bladder neck and the most proximal end of the urethra usually present an irregular, red, granular appearance. At times the mucosa is velvety in appearance, with interspersed, longitudinal, whitish bands. Often, the mucosa is interrupted by clear cysts or inflammatory polyps. Small openings which have the appearance of infected, dilated ducts may also be seen. The trigone presents a picture of chronic inflammatory disease. Congested blood vessels coursing over its surface accentuate the sharp lines of demarcation between the infected trigone and the normal surrounding bladder mucosa. In some of our cases the trigone was covered with a thin membrane—the so-called membranous trigonitis. In practically all of this group the disease process was confined to the posterior third of the urethra and trigone.

Renal function tests should be done routinely and in the majority of cases roentgenograms of the urinary tract should be made. Appropriate studies should also be made for focal infection.

The interval between the onset of symptoms and the diagnosis in our series of cases proved of interest. It ranged from 3 days to 42 years, with an average interval of 3.5 years. The symptoms presented by this group of patients, chiefly referred pain, had led to many diagnostic errors, such as, acid urine, chronic diseases of the lower part of the abdomen, and nervousness. It was interesting

to note that some of these patients had been referred for psychiatric treatment, and some had even had shock therapy.

TREATMENT

The response to treatment in cases of chronic urethritis is often dramatic. Dilatation of the urethra incident to passage of the cystoscope is frequently followed by almost complete relief of symptoms, sometimes within 24 hours.

Once the diagnosis has been established, the treatment involves chiefly three steps: (1) irrigation of the bladder; (2) dilatation of the urethra with sounds and (3) instillation of silver nitrate solution into the posterior urethra.

Bladder irrigation may be optional but we believe that it should be done as a safeguard against the introduction of infection and for the purpose of stretching the bladder to normal capacity. In the majority of cases if the bladder has become accustomed to frequent and urgent urination over a long period, its capacity is reduced.

Because of the scar tissue incident to infection the passage of sounds seems essential and I doubt if many of these patients would obtain relief without it. One should start with whatever size the urethra will comfortably accommodate, usually a 24 to 26 French sound. A larger size should be used with each successive treatment until one reaches the maximum size which the particular canal can take without tearing, as the object is to stretch the urethra but not to tear it; usually the largest sound used is a 28, 30, or 32 French. In patients with congenital narrowing at the external meatus better results will be obtained if meatotomy is performed.

Instillations of silver nitrate into the posterior urethra, like bladder irrigations, may also be optional. In our experience, however, better results have been obtained when it is used. Two cubic centimeters of 0.5 per cent solution of silver nitrate is used as an initial instillation and gradually the percentage of the solution is increased with each treatment to a maximum of 2 per cent in cases in which it is well tolerated.

This type of treatment given once or twice a week for a period of 6 or 8 weeks will afford complete relief of symptoms in 90 per cent of cases of chronic urethritis. The remaining 10 per cent fall chiefly into two groups: (1) a few intractable cases of granular urethritis which may be treated either by direct application of 10 per cent silver nitrate to the trigone and urethra through an endoscope or by very light fulguration with a coagulating current; and (2) some cases with long inflammatory polyps around the internal

sphincteric area which will require fulguration. In this latter group, however, it must be remembered that fulguration of the inflammatory polyps at the bladder neck does not constitute a cure. After the polyps have been destroyed, the urethra has to be treated in the same manner as those cases without polyps. In all cases of chronic urethritis careful consideration should be given to possible disease of the pelvic organs, especially the cervix, as well as to distant foci of infection. All such foci should be removed regardless of whether or not they may have any direct bearing upon the cause, persistence or recurrence of chronic urethritis. It should be recognized that in many cases predisposing factors remain after the urethritis has been cured and for that reason recurrences will be encountered. On the other hand, far more trouble originates from failure to recognize the condition than is encountered in management once an accurate diagnosis has been made.

SUMMARY

Chronic urethritis is a condition in which pathologic inflammatory changes occur in the urethra and vesical trigone which appear granular on inspection and which produce many annoying urinary symptoms, chiefly irritation of the bladder and pain. The diagnosis is not difficult if one is familiar with the pathologic changes which characterize the condition and if complete urologic studies are made in suspected cases. The disease can be cured within 6 to 8 weeks by irrigating the bladder, dilating the urethra with sounds and instilling solutions of silver nitrate into the posterior urethra. However, it should be remembered that after the inflammation has been cured, predisposing factors may be responsible for recurrences.

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VAGINAL HYSTERECTOMY

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IN the practice of gynecology, the operation of hysterectomy is perhaps the most frequent as well as the most serious of major procedures on the female genital tract. The revived interest in vaginal hysterectomy, as noted by numerous reports from all parts of this country, is very gratifying to those of us who have been using it for a period of many years.

The dispatch with which it can be done and the splendid end results obtained are unparalleled in gynecologic surgery. Precedence in its performance is obscured by many claims extending back more than one hundred years but in its present stage of development, the effort of any individual is foreshadowed by the labors and observations of many others. The description of the masters who performed this operation during the period when aseptic surgery was in its infancy is still classic and, except for finer details, describes clearly the technic which we all follow today.

However, between the years 1900 and 1930, the number of vaginal hysterectomies performed in comparison to abdominal hysterectomies was extremely low and proves that most operators were trained in abdominal rather than in vaginal technic. Dührssen by 1906 had performed 1600 vaginal celiotomies with a mortality of 2 per cent. Kennedy states that Joseph Price did not know how many vaginal hysterectomies he had performed but estimated that the number was more than 4,000, with a mortality of a fraction of one per cent. These unquestioned statistics eloquently prove the unusual safety of all vaginal operations and are substantiated by recently published figures from all over the country. Blain and his associates reported 567 vaginal hysterectomies from 1925 to 1942, with 3 deaths. In the four years preceding the publication of his paper, 307 vaginal hysterectomies were performed without a death. In a table published by Blain, he abstracted 4,088 published cases by different operators with an average mortality of .86 per cent. Heaney reports 650 consecutive vaginal hysterectomies without a death and a total of 1237 cases in non-malignant lesions with 3 deaths. Danforth and his associates did 600 cases with one death.

This paper is based on a total of 362 cases performed over a

period of 20 years, either by myself or under my supervision, with a mortality of 1.

Unless definite contraindications are present, we believe that vaginal hysterectomy should always be considered where hysterectomy is to be performed and, if possible, the operation should be carried out by this route.

It is only proper that the use of irradiation should be included in the tabulation of extirpation of the uterus in that this frequently employed measure produces the same physiologic end result as surgical excision with the exceptions that the fibrosed organ is left in situ and that the ovaries are destroyed. Because of its usual simplicity, there is no doubt but that many patients are subjected to irradiation who could be better treated by hysterectomy. We do not advocate that operation be utilized in all cases but believe that the decision as to the use of irradiation or hysterectomy should be based upon a careful individual gynecologic study and not upon the judgment of the radiologist or the whim of the patient. There is no doubt but that radium or x-ray is often used without taking into consideration the frequent need of proper vaginal repair for prolapse of the uterus, bladder, and rectum. Notwithstanding statements to the contrary, we believe that the fibrosis and atrophy of the uterus and its appendages after irradiation has but little, if any, effect on the pelvic supports, and often results in an accentuation of the dragging pain and discomfort. Most authorities agree that the menopause syndrome is, as a rule, much later in appearing than we formerly thought and the early destruction of the ovaries and the consequent decrease in ovarian hormones which rapidly follow the use of radium and x-ray are undesirable. Of course, we all admit that irradiation is irrevocably indicated in the treatment of cervical carcinoma and also as an interval treatment after diagnostic curettage in corporeal cancer before hysterectomy. We believe, however, that it is used all too frequently to stop the menstrual flow at or about the time of the menopause, and we advise the use of vaginal hysterectomy with preservation of one or both ovaries. Most patients in whom irradiation is used are in the fourth and fifth decades of life, which is much too early to surmise that no ill effects will result from complete cessation of ovarian function. Because of the ligation of the blood supply close to the uterus in vaginal hysterectomy, the ovaries do not undergo rapid cystic degeneration and, in our experience, continue to function at least for some time. There is, no doubt, also a less pronounced psychologic change in vaginal hysterectomy than that noted in either abdominal hysterectomy or irradiation.

The argument usually advanced that abdominal hysterectomy is

preferable to vaginal hysterectomy in that it permits exploration of the abdominal viscerae is unconvincing as exploratory laparotomy has been outmoded by precision instruments of diagnosis such as the x-ray, gastroscope, cystoscope, peritoneoscope and so forth. Exploratory laparotomy, therefore, is very rare and should be employed apologetically.

The indications for vaginal hysterectomy are identical with those for abdominal hysterectomy with a few exceptions. Extensive pelvic inflammatory disease with fixation is a contraindication. However, under modern gynecologic practice, few of these cases are subjected to operation until after a long course of conservative therapy which frequently renders operation unnecessary. After a thorough trial of treatment, if it becomes necessary to remove the uterus and adnexae, the condition may have improved to the extent that it will fall in the movable type and can be subjected to vaginal hysterectomy as well as to abdominal hysterectomy. It is not often necessary to consider this contraindication, as young women are rarely submitted to any type of hysterectomy except for malignancy or symptom-producing tumors. Pelvic inflammatory disease, due to specific, postabortal or postpartum infection, almost always occurs in comparatively young women in whom ablative operations should be avoided, if possible. Women over 40 seldom present the fixed pelvic viscerae seen in young women and usually have absorbed the inflammation to a great extent. Also, the use of chemotherapy and penicillin in pelvic exudates has to a great degree eliminated the residual effect seen a few years ago. It is generally admitted by most gynecologists that by far the greater percentage of pelvic inflammatory disease clears up under adequate treatment and that no type of operation should be performed unless masses persist or repeated acute exacerbations disable the patient.

While some gynecologists advise vaginal hysterectomy in malignancy, we believe that, as a rule, uterine malignancy is better managed by other methods. Irradiation gives better results in the average case of cervical cancer as it is generally conceded that the diagnosis is not made until after there is considerable involvement of the cervix. However, six patients with early cervical carcinomata as shown by biopsy are included in this series, all of whom are living and well, and 3 additional cases of unrecognized cancer of the cervix were found by routine pathologic examination of the specimen after vaginal hysterectomy. Two of these patients are living and well and one cannot be traced. The cautery was always used in the circumcision of the cervix and division of the broad ligaments after clamping and both ovaries and tubes were removed in the recognized cases, though not in the accidentally found ones.

In malignancy of the corpus, we have considered vaginal hysterectomy contraindicated, as we believe that vaginal removal does not allow a sufficiently wide ligation of the blood supply and removal of the broad ligaments. The necessary traction on the cervix is unwise and is not in accord with our conception of the treatment of malignancy. It has been our policy to do a diagnostic curettage, followed by the use of at least 2400 mg. hours of radium, in corporeal carcinoma and to perform a complete abdominal hyster-salpingo-oophorectomy 4 to 5 weeks later. A few gynecologists have published splendid results by hysterectomy alone, but it is our opinion that there is a spread of 10 to 15 per cent in favor of those treated preoperatively by radium over those treated by hysterectomy alone. In very obese patients, or in those suffering with debilitating or constitutional disease, we have employed vaginal hyster-salpingo-oophorectomy after radiation in carcinoma of the fundus on 4 occasions with good results. All of this group are alive and present no recurrence after 12 to 3 years. Two additional cases were started by this method but later completed by the abdominal route as it was felt that the operation could not be continued safely through the vagina.

Previous laparotomy has not been considered an absolute contraindication as a majority of these patients can be successfully subjected to vaginal hysterectomy, if there is no evidence of extensive adhesions. After opening of the anterior or posterior cul-du-sac, it is simple to ascertain if any possible adhesions can be ligated under direct vision and, if not, the vagina is closed and the operation completed from above. Ventral fixation in retrodisplacements which was in common use a few years ago is rarely performed now, but may present difficulty in an occasional patient, but we have found that frequently a false fundal ligament may be found and cut. However, if the fundus is firmly attached to the anterior abdominal wall, we have completed the hysterectomy through an abdominal incision. The more frequent round ligament suspension rarely necessitates abandonment of the vaginal route. Eleven cases out of 68 who had had previous laparotomy were found to have adhesions which could not be safely separated from below and the hysterectomy was completed through the abdomen. It only requires a few minutes to carry out the laparotomy unless the adhesions are very dense and the patient is in much better condition than if the entire operation had been undertaken from above. To clarify the tabulation of the total number of vaginal hysterectomies included in this report, no case is included in which it became necessary to complete from above. However, in several patients, appendectomy or oophorectomy for

ovarian cysts supplemented the vaginal hysterectomy, and are included in the final tabulations.

Endometriosis is usually a contraindication but in most cases the diagnosis can be made prior to operation. Endometriosis simulates inflammatory disease and therefore is not ordinarily attacked vaginally. However, adenomyosis is frequently confined to the uterus, does not usually produce fixation and can be subjected to vaginal hysterectomy. It has been necessary on 3 occasions to abandon contemplated vaginal hysterectomy in unrecognized endometriosis but several mild cases have been completed through the vagina.

The previous use of radium has not been acknowledged as a contraindication unless followed by marked fixation, which is unusual. Many of these apparently fixed uteri can be easily drawn downward after division of the cardinal ligaments and safely removed. To illustrate, one woman, aged 42, who weighed 240 pounds and had never been pregnant, but had suffered numerous attacks of meno-metrorrhagia over a period of 3 years and who had been treated by radium and curettage on two different occasions during a period of one year, was treated by vaginal hysterectomy without particular difficulty. The cause of the bleeding was found to be a 1.5 cm. ulcer at the posterior and internal cervix. No malignancy was shown in the previous curettements or in the removed specimen. Large fibroid tumors or ovarian cysts are generally considered contraindications but exceptions can be made if the advantages outweigh the disadvantages. However, some operators have advocated the removal of large tumors vaginally by morcellation and in support have tabulated mortality rates which are much lower than in abdominal hysterectomy. We believe, however, that these arguments are confusing and perform abdominal section in uterine tumors larger than a 3½ month pregnancy unless excessive obesity or other contraindications are present. Some writers have advocated removal of ovarian cysts, frequently of large size, after evacuation of the fluid contents with a trocar, but we, as a rule, have practiced removal of these growths from above. There are also well recognized dangers in the aspiration of some ovarian cysts, which are well avoided, if possible.

No effort has been made to enumerate the various indications for vaginal hysterectomy as these do not differ from abdominal hysterectomy but a clear cut conception as to the contraindications appears to be of more value. It has been our policy always to have available a laparotomy setup so that if any difficulty arises in the vaginal hysterectomy, prompt resort to abdominal hysterectomy can be had. This precaution not only encourages the operator in

carrying out the necessary steps from below but avoids undue hazard to the patient.

The advantages of vaginal hysterectomy are perhaps the greatest argument for its performance. The mortality, as previously stated, has been shown by published statistics to be extremely low and cannot be equaled by any abdominal operation. However, the morbidity, if a temperature of 100.5° over a period of 48 hours after the first day is considered a criterion, is slightly greater than abdominal hysterectomy and, in our opinion, is due to the larger amount of ligature material used and the frequent necessity of doing extensive plastic dissections.

The cervix is practically always removed but can be left if the operator thinks necessary. The removal of the cervix is a distinct advantage as the retained cervix is frequently the site of cancer which is difficult to treat successfully. The proper plastic operations can be carried out at the same time without subjecting the patient to an additional operation. Infection is almost unknown, as the vagina and pelvis are much more resistant to infection than the remainder of the abdominal cavity but, if it does occur, drainage is along gravity lines and the infection is not serious. We have had no serious cases of infection, though some minor forms have occurred. However, a rigid technic should be followed throughout in order to secure full advantage of the natural vaginal immunity to pathogenic organisms.

Adhesions and herniae should never occur if the closure is properly carried out, as shown in the figures. A small laparotomy pack is placed in the pelvic cavity at the time of the delivery of the fundus, which together with the Trendelenberg posture effectually prevents extrusion of the intestines. It has been our policy to dust 3 or 4 Gm. of sulfanilamide crystals into the pelvis before closure of the peritoneum. This is easily done by lowering the head of the table to an exaggerated degree and exposing the pelvis by anterior and posterior retractors before tightening the closing sutures. We also administer 1 Gm. doses of sulfadiazine with sodium bicarbonate four times daily after the second postoperative day. In order to increase the blood supply in elderly women, 1 mg. of stilbesterol in oil is given intramuscularly daily for a week preceding operation and for a week afterward. Only an occasional patient suffers with nausea after its administration. This usually occurs with the first injection, if at all.

Vaginal hysterectomy is easily performed in the elderly or obese patient and, if time and care are used, can be carried out under local

infiltration anesthesia. It is important that the perineum be carefully blocked before infiltrating the anterior vaginal wall and broad ligaments as the weight of the speculum is painful. Eighteen of our cases were completed under local anesthesia of 1 per cent novocaine with 5 minims of adrenalin in each 50 c.c. of solution. We formerly used $\frac{1}{2}$ of 1 per cent solution of novocaine, which was unsatisfactory. The adrenalin is omitted in extreme hypertension but not in moderately elevated blood pressure. Cleavage planes are much more rapidly entered after infiltration, which prompts some gynecologists to use normal saline for this purpose. We have not found this necessary, however. No untoward symptoms have occurred but if the patient is apprehensive, a small amount of pentothal-sodium is used to allay her nervousness. As in any type of gynecologic surgery, the use of a local anesthetic is excellent experience for the gynecologist in that it emphasizes the importance of gentle handling of tissues and of a meticulous technic. In all our vaginal operations, we have exercised particular care in avoiding strain on the back and legs. The crutches are well padded to avoid pressure on important structures and extreme degrees of flexion and extension are avoided.

We have had but little trouble with hemorrhage at any time, as the uterine and ovarian arteries are ligated separately and twice. The traction ligatures are always placed distal to the hemostatic ligatures on the 4 cardinal vessels, the 2 ovarian and the 2 uterine. Traction is never made on the ligatures which are applied primarily for hemostasis. In closing, if it becomes necessary to exert any great degree of pull on the broad ligaments, they are grasped with Allis clamps in order to avoid displacement of the ligaments. By making these two principles inviolable rules, we have never found it necessary to do abdominal section for hemorrhage. If any bleeding point is noted along the broad ligament, it can easily be found by applying Allis clamps to the ligament progressively from below upward which permits inspection of all cut edges. Most of the anastomoses are parallel with the long axis of the body of the uterus, and do not retract. The cut edges of the vaginal vault may bleed but the vessels are easily controlled by a few interrupted stitches.

Shock occasionally occurs, particularly in prolapse cases where extensive plastic procedures have been necessary, but has invariably responded rapidly to the intravenous administration of blood, plasma or normal saline and the patient appears none the worse after a few hours. It is often stated that vaginal hysterectomy is only indicated in prolapse of the uterus, but we have found that almost every case of surgical shock has been in this type of patient

as a simple vaginal hysterectomy without plastics is completed much more quickly, with less trauma and has a smoother postoperative course than the average prolapse.

There have been a few cases of prolapse of the vaginal vault with recurrence of the cystocele and rectocele which occurred during the first 10 year period. Since we have adopted a different vaginal closure with suturing of the uterosacral ligaments together and, if necessary, suturing of the broad ligaments to the descending rami of the pubis with silk, we have had no marked cases of vaginal vault prolapse or recurrence of the cystocele and rectocele. This complication, of course, is far more likely to occur in procidentia uteri or third degree uterine prolapse than with ordinary vaginal hysterectomy without great relaxation of the pelvic supports.

For the first 10 year period, interposition of the broad ligaments, as devised by Mayo and others, was the usual method employed in vaginal hysterectomy, particularly if accompanied by a marked degree of prolapse, the usual indication for operation at that time. In the last 10 years we have used it in only 14 per cent of all cases, but depend upon a careful anterior and posterior colporrhaphy, suturing of the uterosacral ligaments together as advised by Bissell, and bunching of the broad ligaments as suggested by George Gray Ward. However, we still believe that in procidentia uteri, interposition of the broad ligaments is the method of choice.

There have been no known injuries to either ureter, but the bladder has been entered 3 times, which was immediately repaired without interfering with convalescence or with the final result. The technic we use and recommend as shown, in part, by the illustrations, opens the anterior cul-de-sac early in the operation, which permits the placing of a narrow retractor beneath the bladder. The ureters and bladder are therefore removed from the operative field and are not easily injured. The rectum has not been entered at any time through the vaginal vault but has been accidentally wounded on two occasions in the repair of extensive rectoceles, one of which healed readily without mishap and the other required later operation for a rectovaginal fistula. There have been no injuries whatever to the large or small intestines, other than the rectum, largely due to the fact that if extensive intestinal adhesions are encountered, no further effort is made to complete the operation through the vagina. We have had no cases of intestinal obstruction, ileus or other serious abdominal complications. Distention is extremely rare and generally responds readily to low enemata, hot applications or prostigmin within a few hours. It has rarely been necessary to use gastric lavage or a Levine tube. Nausea and vomiting almost never occur.

Phlebitis of varying degrees occurred in 9 patients but did not seem to be as severe as that following abdominal section. We insist that all patients exercise their legs and change positions at frequent intervals and allow them to sit up on the third day and get out of bed on the seventh day. Fatal pulmonary embolism has not been encountered. However, our single mortality, which occurred on the fifth day, was first diagnosed as a possible pulmonary embolism, but was later proved to be coronary occlusion. One of our early patients died 6 weeks after operation of lobar pneumonia and is not included in our mortality statistics. There had been several cases of influenza in her family and she was perfectly well until the onset of the pneumonia. No autopsy was performed as she resided some 50 miles from Atlanta.

Shortening of the vagina occurred in approximately 25 per cent of the early cases, but since adopting the present technic, which very carefully lengthens both the anterior and posterior vaginal walls, as well as suspends the vaginal vault after suturing together the uterosacral ligaments, we have been able to construct a vagina of normal proportions without difficulty. I believe that carefully performed plastics, which take into consideration the mucous membranes and other structures available, will, in practically every instance, lengthen the vagina to normal proportions even if it is turned completely out. These cases, of course, must be carefully oriented before making the original incisions.

While all types of anesthetics have been used, such as ether, cyclopropane ethylene, local, spinal and so forth, most of our cases in the past 5 years have had spinal anesthesia consisting of 18 mg. of pontocaine and 50 mg. of novocaine, dissolved in 4 c.c. of spinal fluid, and which is usually injected in the second lumbar interspace. Continuous veneclysis of 1000 c.c. of 5 per cent glucose in normal saline, with 1 Gm. of pentothal sodium, is given intravenously throughout the operation at a rate of 40 to 60 drops to the minute, which produces drowsiness on the part of the patient and overcomes any undue apprehension during the course of the operation and for several hours thereafter.

The preoperative preparation is as important in vaginal operations as in contemplated laparotomy. We have found that a few days' rest in bed decreases the bleeding and allows the patient to become accustomed to the hospital routine, as well as permits proper preoperative examinations and medication. A good night's rest before operation is assured by the administration of 3 grains of sodium amytal, which is repeated 2 hours before operation. Panta-

pon and atropine are given an hour before going to the operating room.

Nine cases of enterocele have been encountered in this series, 4 of which were of large size. The sac was ligated just as an inguinal hernial sac is ligated and several sutures placed to unite the uterosacral ligaments in order to reinforce the hernial opening. One of these patients had been subjected to two abdominal operations with plastic procedures on the vagina in an effort to correct an unrecognized enterocele which was the size of an orange and which had promptly recurred as soon as she stood on her feet. An enterocele is frequently mistaken for a rectocele unless it is kept in mind by a sponge forcep in the rectum, or a finger inserted from above downward after entering the peritoneal cavity, anteriorly, should readily make the diagnosis. There was no recurrence in any of these cases.

Complete congenital prolapse of the uterus is a rare condition, of which we have seen four. Two of these were successfully treated by vaginal hysterectomy with interposition of the broad ligaments, obliteration of the cul-du-sac from below with a high perineorrhaphy and anterior colporrhaphy. The other two patients were relieved by the abdominal bi-section and suspension of Murphy and Crile and the proper vaginal plastics. The cul-du-sac of Douglas was, also, obliterated by purse string sutures inserted from above. The final results were excellent in this group. However, other degrees of congenital prolapse of the uterus lend themselves admirably to vaginal hysterectomy and there have been no known recurrences in this group.

Urinary incontinence of the stress type and which is present on coughing or laughing is a frequent concomitant of prolapse, cystocele and rectocele and since the adoption of the technic of Kennedy, of New York, who has made extensive and detailed studies of the urethra with its muscular and fascial attachments, we have secured excellent results in correcting this condition. The urethra must be thoroughly mobilized and the superior layer of the fascia endopelvina brought across so as to support it beneath the pubic arch. Counsellor and others have reported large series in which this technic was used with uniform good results. We had been somewhat disappointed in the results in stress incontinence before the adoption of the operation of Kennedy, as the suture of Kelley at the vesical neck did not take into consideration the freeing of the urethra laterally to the pubic arch. In the Kennedy operation, we have occasionally found it necessary to pack with small strips of iodoform gauze beneath the pubis in order to control hemorrhage

as the plexus of veins is very rich in this locality, but we have had no ill results from its use.

The technic of vaginal hysterectomy, of course, depends to some extent on the pathology involved, but follows definite lines of com-

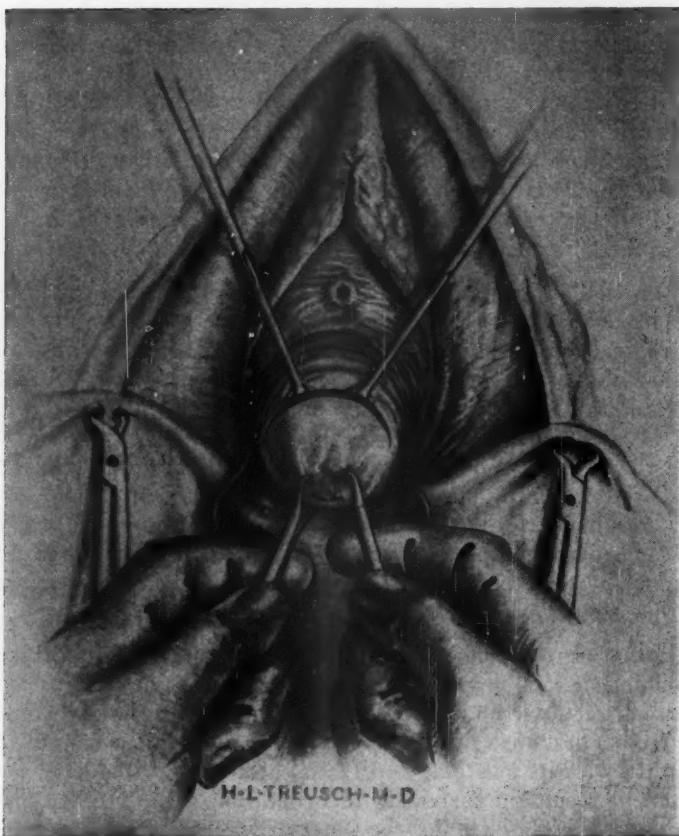


Fig. 1. Transverse incision of the anterior vaginal wall just below the bladder reflexion. Tenaculæon cervix and Allis clamps on mucous membrane.

mon application. Contrary to frequently expressed opinions, it is much easier to remove a uterus with normal supports than a prolapsed one, as the operation is expedited by the absence of extensive dissections for repair of the pelvic supports. For example, if the indication for hysterectomy is small fibroid tumors, adenomyosis without involvement of the broad ligaments, cervical and uterine polyps or functional bleeding, whether in nulliparous or multiparous

women, the hysterectomy only is necessary and can be carried out without subjecting the patient to other time consuming measures. However, most hysterectomies are performed in women who have borne children and there is usually some relaxation of the perineum,

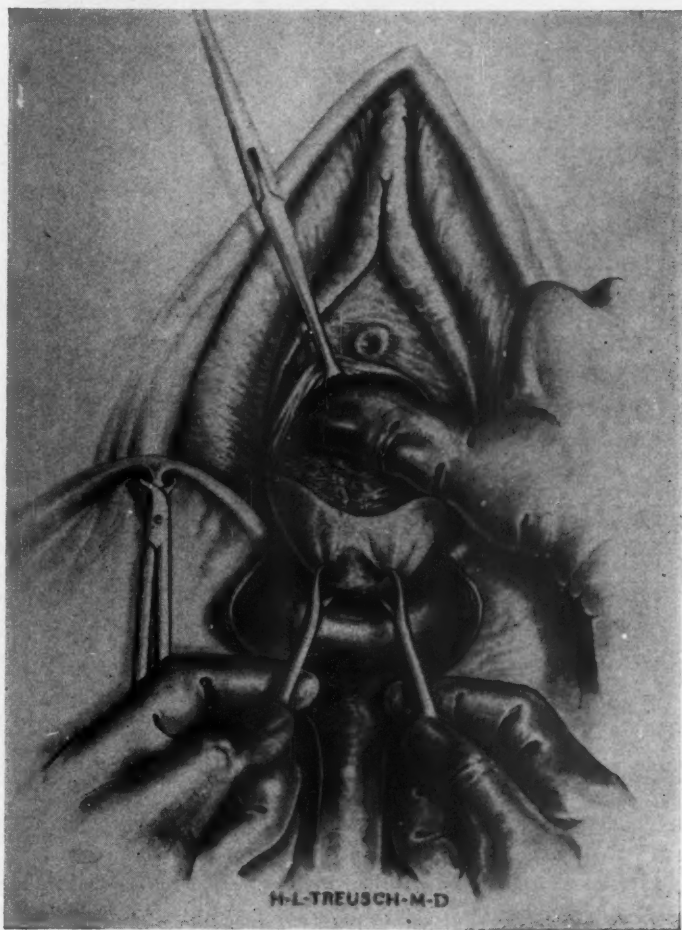


Fig. 2. Bladder separated from cervix by blunt dissection.

at least, which somewhat simplifies the hysterectomy but necessitates the performance of a perineorrhaphy, with or without colporrhaphies.

A transverse incision is made just beneath the bladder reflection

on the anterior cervical lip and the bladder and anterior vaginal wall are rapidly dissected upward, usually without difficulty. A posterior transverse incision back of the cervix is also made and

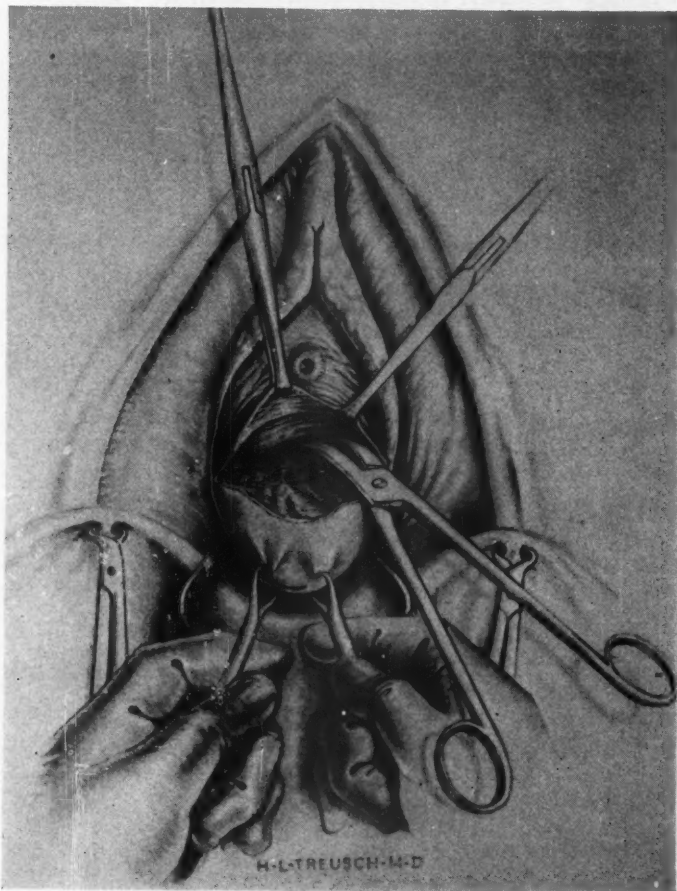


Fig. 3. Vesico-uterine ligament cut with scissors and bladder being dissected from the uterus.

the dissection carried down to the peritoneal reflection in the posterior cul-du-sac. The two limbs of the transverse incisions are joined laterally by lateral incisions and the lateral portions of the vaginal vault carefully brushed off with gauze in order to avoid injury to the uterine vessels or ureters. The dissection is continued until the vesico-uterine ligament is reached at the peritoneal reflection anteriorly which is then incised after probing the bladder, if

necessary, and marked with a single strand of No. 1 plain catgut in a mosquito forcep. A thin Deaver retractor is inserted beneath the bladder which carries the bladder and ureters well out of the

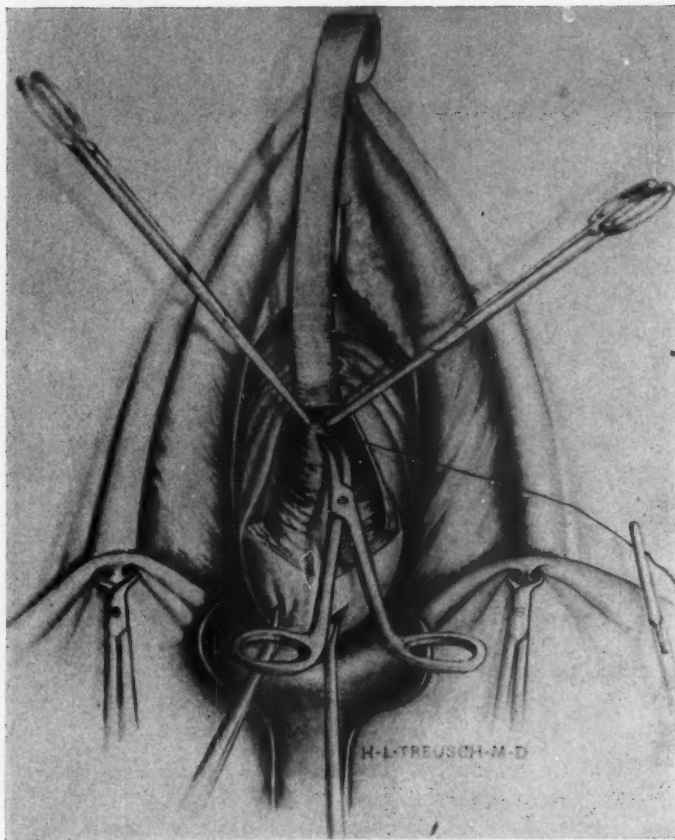


Fig. 4. Bladder and anterior vaginal wall retracted which carries the uterus upward and lateralward. Pelvic cavity being opened.

way. A curved Kocher toothed clamp is then applied to the cardinal ligament on one side in order to crush the blood supply. The clamp is then removed without cutting the tissues and a ligature of No. 1 chromic catgut applied well up on the ligament for hemostasis only. The clamp is again applied distal to the ligature and the cardinal ligament cut. No. 1 chromic catgut is inserted proximal to the clamp, carefully tied and marked with a curved Kelly forcep on a

double strand of catgut for future identification. The opposite uterine vessels and cardinal ligament are ligated in the same way. In large uteri or cervical hypertrophy, it is often necessary to ligate

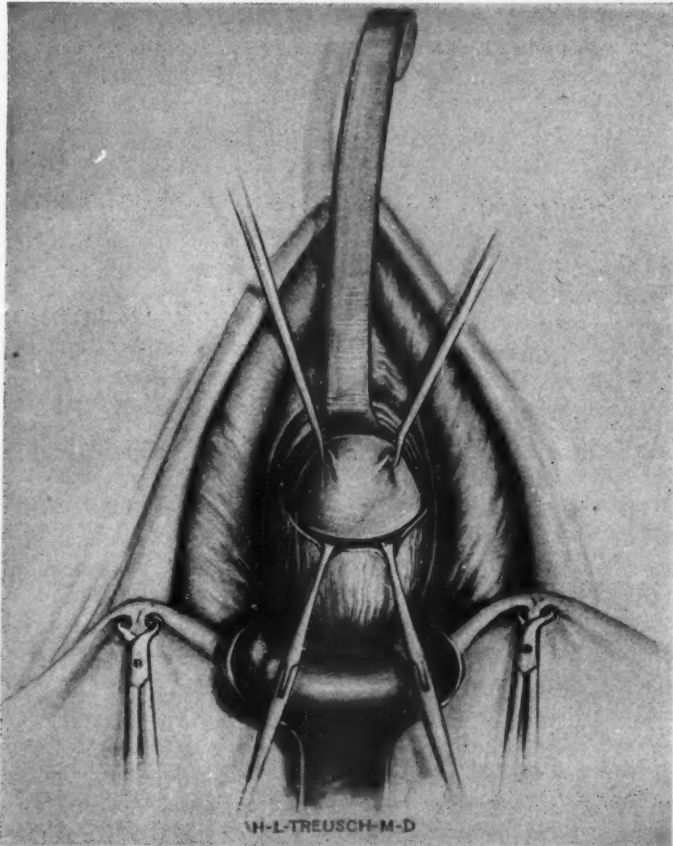


Fig. 5. Incision in anterior vaginal wall extended posteriorly and laterally. Mucous membrane to be dissected posteriorly in order to expose utero-sacral ligaments and laterally to expose uterine vessels for ligation.

the cardinal ligaments and the contained uterine vessels as well as a few additional bites of broad ligament before opening the anterior or posterior cul-du-sac. The dissection and ligation of the broad ligament is then progressively carried upward until the peritoneal coat of the uterus is encountered. Great care should be exercised in clamping the broad ligament in order to avoid splitting the ligament or injuring the bladder or ureters. Another traction suture is

applied at this point and a single strand of catgut is clamped with a straight Kocher clamp. The cervix is then elevated, the posterior cul-du-sac opened and the uterosacral ligaments identified and

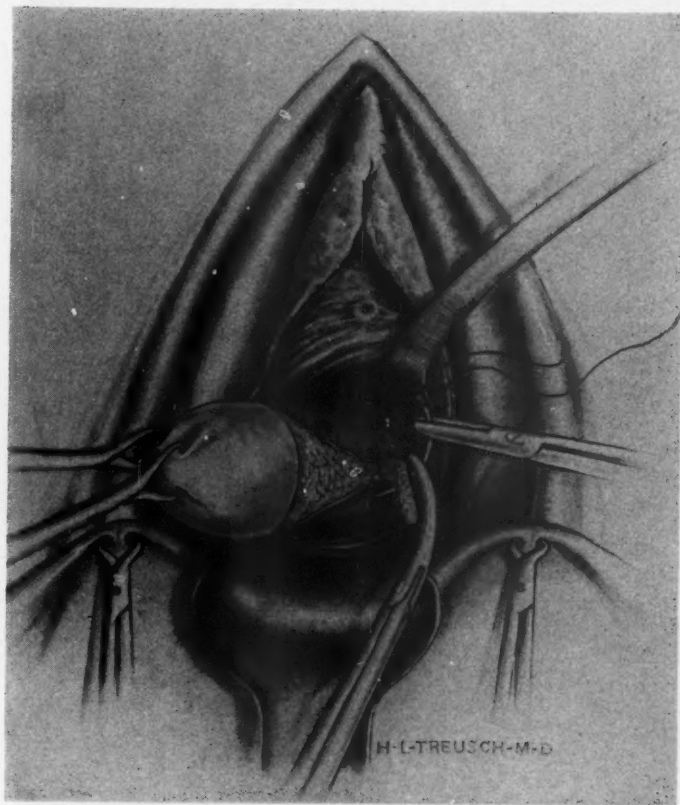


Fig. 6. Left cardinal ligament clamped with Kelly curved-toothed clamp, cut and ligature being inserted.

clamped. A No. 1 plain catgut is carried through the ligament on each side and clamped by a double strand of catgut in the grasp of mosquito forceps, after which it is cut. As a rule, the fundus is pulled downward beneath the bladder at this point with a tenaculum forcep; the tube and broad ligament, which includes the ovarian vessels, clamped and ligated as was the uterine, by a hemostatic suture before cutting. A clamp is then applied distal to the hemo-

static ligature on the broad ligament which also contains the round ligament and the cut end of the tube, cut, and a double strand of No. 1 chromic catgut applied around the clamp which is also tied,

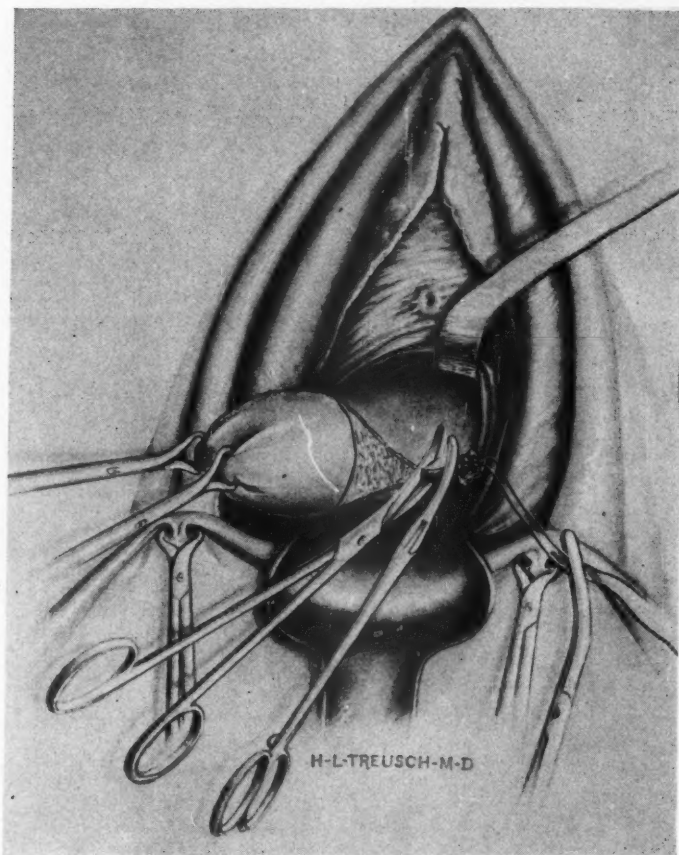


Fig. 7. Progressive ligation of broad ligament in small bites being carried out in same way. These steps to be taken on opposite sides. Ligatures left long and regularly marked in the same way in order to facilitate closure.

left long and identified by the application of a straight Kocher clamp. The broad ligament on the same side is progressively ligated downward until the previously ligated portion of the broad ligament from below is encountered. These steps are carried out on the opposite side in the same manner. It will be noted from the tables that at the completion of these steps, the broad ligaments are easily identified in their different portions by the type of clamps and sutures

used. The ovaries and tubes are inspected, and if it is necessary to remove them, they are pulled down, the infundibuloform ligaments doubly ligated, and the tubes and ovaries removed.

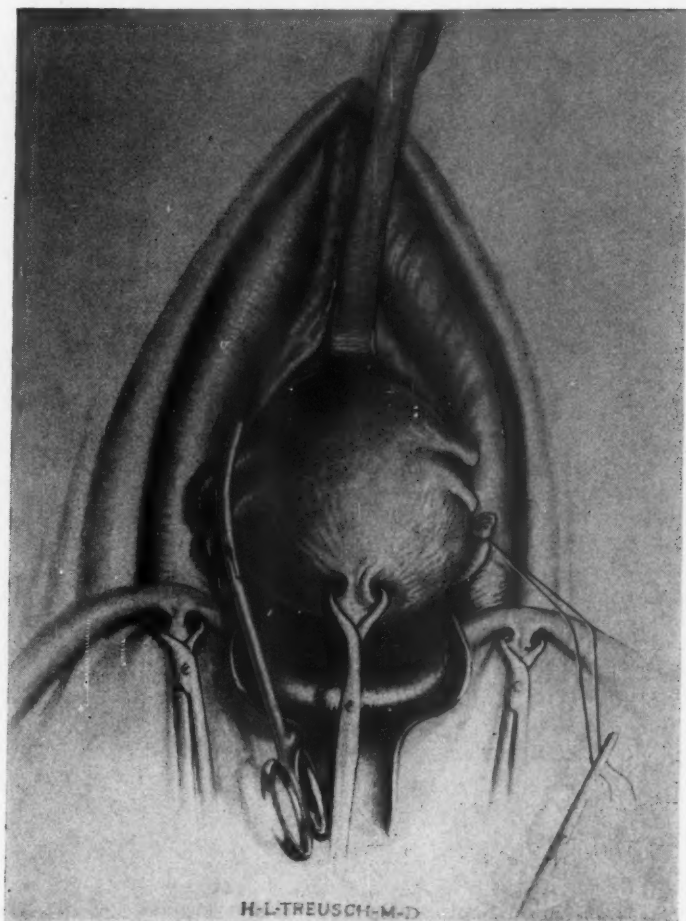


Fig. 8. Uterus delivered beneath the symphysis with tenaculum forceps. Clamp applied to the right tube and round ligament preparatory to cutting. This step has been carried out on the opposite side.

The closure is a modification of the method devised by Heaney, of Chicago, in which a suture enters the anterior cut edge of the vaginal vault, picks up the vesicouterine ligament at about its center and is carried one or two stitches along the peritoneal reflection anteriorly, surrounds the round ligament and the cut end of the

tube and upper broad ligament which again ligates the ovarian vessels; thence through the middle of the broad ligament at about the point where the single strand of catgut is attached and sweeps

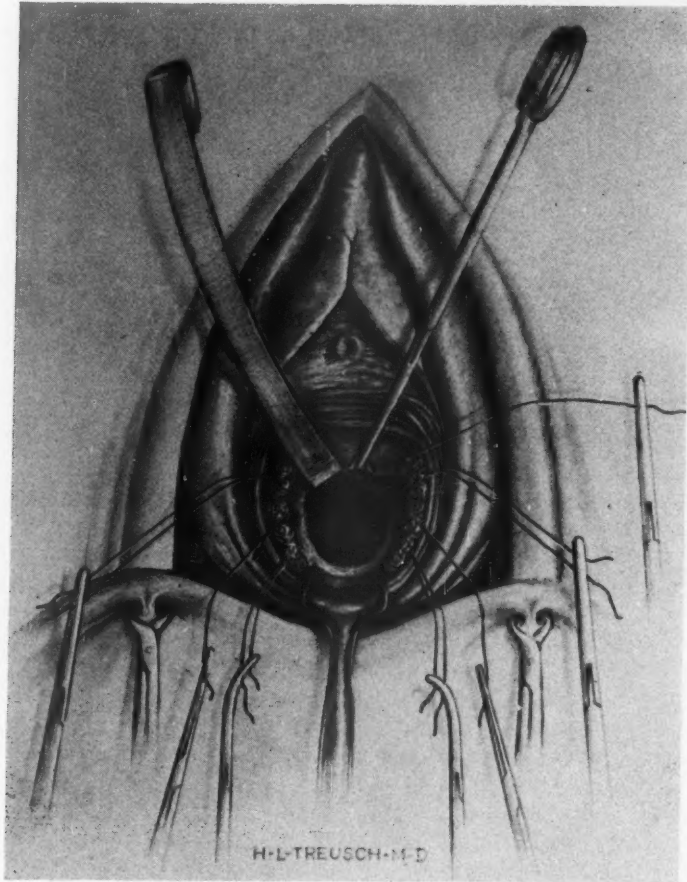


Fig. 9. Stumps of the broad ligament shown. Single strand of catgut in the grasp of mosquito forceps on the vesico-uterine ligament. Double strand held by straight Kocher clamp attached to the round ligament and cut end of the tube on each side. Single strand applied to the center of the ligaments with straight Kocher clamp and double strand to the cardinal ligaments held by curved clamps. Utero-sacral liga-

ments shown but identifying clamp and suture not shown.

around the cardinal ligament in order to take up any slack which again ligates the uterine vessels, passes through the uterosacral ligament of the same side as far up as necessary in order to prevent vaginal vault prolapse, takes one or two bites of the posterior

parietal peritoneum and passes through the posterior cut edge of the vaginal vault. This suture is not tied but left long until another is applied in the same manner on the opposite side after which both

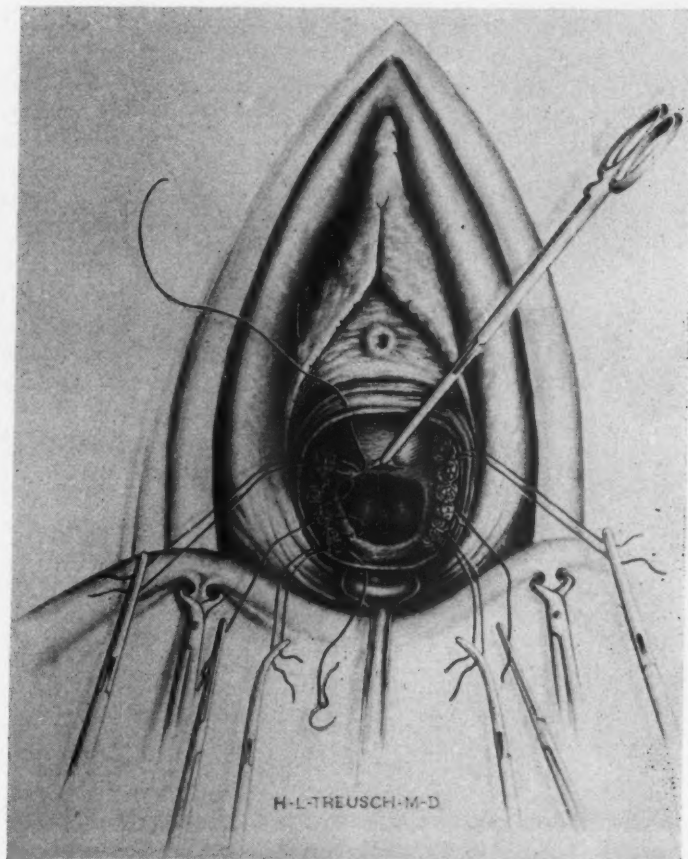


Fig. 10. Number 2 chromic catgut starting in anterior vaginal wall at the vault, passed through vesico-uterine ligament, thence around the round ligament and cut end of the tube, thence through the middle of the ligament from within outward, then brought over the cardinal ligaments, thence through the utero-sacral ligaments and out through the posterior edge of the vaginal vault on the same side. A similar suture is passed on the opposite side before either is tied. When tied, these bunch the ligaments and fix them to the vaginal vault.

are drawn taut and tied. This is a rapid method of closure and differs slightly from that advised by Heaney, but bunches the broad ligament in a way to take up all the slack, closes the peritoneal cavity and extraperitonealizes the edges of the broad ligaments.

The operation is completed by 3 or 4 uninterrupted sutures in the cut edge of the vaginal vault on each side. No drainage is used. The separate steps are very well drawn in the illustrations which, how-

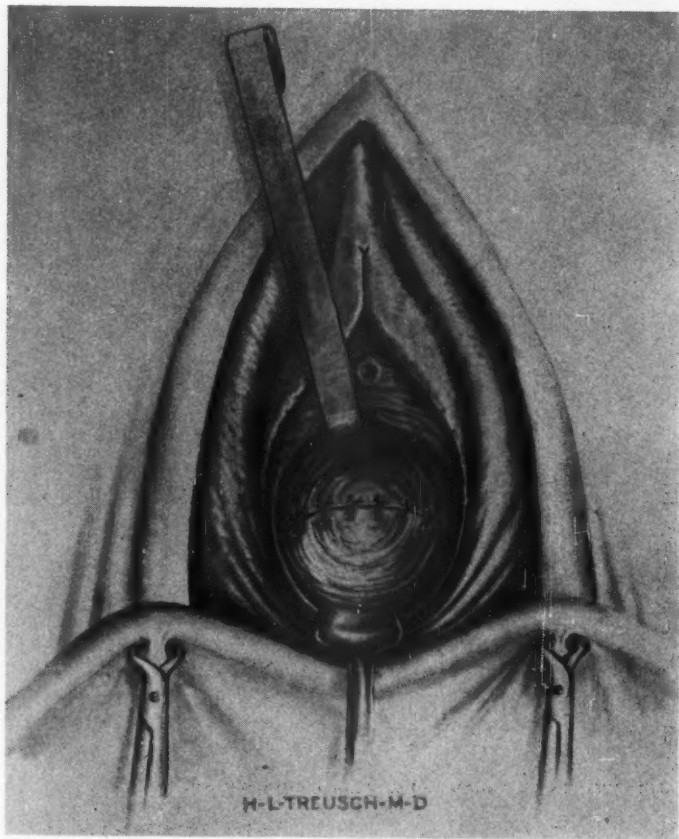


Fig. 11. The two middle sutures tied and lateral sutures applied.

ever, do not show a few of the features described. If it is necessary to correct urinary incontinence or to perform an anterior colporrhaphy, it is done before inserting the closing sutures.

In cases of procidentia, however, we still follow the method of Mayo and suture the broad ligaments together with a continuous mattress suture over clamps and interpose them between the vaginal wall and the bladder. Before beginning the mattress suture, we ligate the four cardinal vessels as previously described, but do not cut them until the clamps are applied.

The final result in prolapse cases is in direct proportion to the care and skill with which the pelvic supports are restored. We usually spend much more time in restoring the pelvic diaphragms in either complete or tentative prolapse, than in the performance of the hysterectomy.

In interposing the broad ligaments, it is very necessary to place several stitches in the vaginal mucosa to correspond with the normal length of the urethra before interposing the broad ligaments, as high interposition of the broad ligaments beneath the urethra will produce diurnal incontinence which is very distressing. This occurred in two of our early cases.

FOLLOW UP

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Improved but recurrence of symptoms, either objective or subjective, of varying degree			36
Poor results			3

TYPE OF OPERATION

Vaginal Hysterectomy

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3. With anterior and posterior colporrhaphy and perineorrhaphy.....	171
4. With interposition of broad ligaments (Mayo technic).....	50
5. With preservation of cervix and anterior and posterior colporrhaphy.	3

AGE GROUP

20 to 30.....	3 cases
30 to 40.....	76 cases
40 to 50.....	162 cases
50 to 60.....	70 cases
60 and above.....	51 cases

In this series of 362, approximately four-fifths of them were in women over 40 years of age; the youngest patient was 22, the oldest 86. Most of the operations were done in the fourth and fifth decades of life, as shown in the tables, and 87 per cent required plastic operations in addition to hysterectomy. Two hundred and twenty-four of these patients have been observed over a period of more than 2 years and the results in practically all have been uniformly good. While my first mortality was experienced only 2

years ago, yet the end results from an objective standpoint during the past 5 years have been much more satisfactory than those performed prior to that time. While a good proportion of our early cases had shortening of the vagina, since adopting a more careful and rigid plastic technic, this objection has been almost entirely overcome. However, this requires careful planning, as previously stated, from the beginning of the operation until it is completed and often a part of the vagina must be constructed from the perineum. We have always carried our posterior vaginal wall dissection in prolapse cases up to the vaginal vault and have carefully sutured the inferior layer of the fascia endopelvina to the vagina and later to the upper triangle of the perineum. The superior layer of the fascia is carefully identified and sutured beneath the bladder in order to avoid a recurrence of the cystocele. This is not always easy, as often the fascia cannot be identified until considerable lateral dissections are carried out.

On several occasions, we have opened the abdomen after the completion of the vaginal hysterectomy in order to remove the appendix or for other purposes and have been agreeably surprised at the neatness with which the structures are closed. The puckered area is no larger in the average case than the nail of the thumb, which explains the almost entire absence of peritoneal reaction at any time. A number of our early cases did not secure relief from stress urinary incontinence, but we have been able to promise practically all patients relief of this symptom if the urethra is carefully mobilized and the fascia secured beneath it, as advised by Kennedy. Of course, vaginal hysterectomy, as all operations, requires training and skill to insure proper performance, but we believe that it is not used as frequently as it deserves.

SUMMARY

1. Vaginal hysterectomy is preferable to abdominal hysterectomy and should be performed in more than 50 per cent of all hysterectomies.
2. Vaginal operations of all kinds carry a negligible mortality but are likely to produce a slightly increased morbidity without any residual effect.
3. Hernia, serious infections and adhesions should not occur in any case and have not occurred in this series of 362 cases reported, so far as we know.
4. There have been no cases of intestinal obstruction, either from prolapse of the intestines into the pelvis or from residual peritonitis.

5. Vaginal hysterectomy is simpler, more readily performed and physiologically corrects the pathology better than does abdominal hysterectomy.
6. Vaginal hysterectomy can be performed in most cases of menorrhagia and metrorrhagia of non-malignant types and is preferable to the use of radium.
7. The final results are in direct proportion to the care with which the hysterectomy is performed, the uterine ligaments anchored and the proper plastics done.
8. Vaginal hysterectomy is not advised in uterine malignancies unless unusual indications are present.

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SAN ANTONIO STOPS A POLIO EPIDEMIC

In the past, Texas fortunately has not experienced the grave polio epidemics which have appeared every summer in the northern and eastern states. Until 1937, when 600 cases were reported in the entire state, there had been only a few scattered cases each year. The first epidemic in any Texas city occurred in San Antonio in 1942 when 90 cases were observed, though in 1943 Fort Worth suffered over 150 cases, and in 1944 Houston and East Texas were similarly affected. Therefore in recent years, Texans, for the first time, have become polio conscious and the various communities have come to realize that they have a recurring problem which requires an annual consideration of this serious menace.

In San Antonio this summer (1946), in the week of April 27, two teen-age children developed poliomyelitis and one of them died. In the next week (May 4), 9 children were affected with 2 deaths; and the next week (May 11) produced 8 cases with 2 deaths. These 19 cases with 5 deaths made the local physicians aware that an epidemic was taking shape very early in the summer season. Consequently, a meeting of health officers, school physicians, orthopedists, neurologists and pediatricians was called and they decided that strong measures should be taken at once if a major outbreak was to be forestalled.

Schools and swimming pools were closed, all children under 21 were barred from churches, movies, and dances; picnics and barbe-

cues were strongly discouraged. But more importantly, an intensive city-wide anti-fly campaign was instituted. Garbage dumps, vacant lots, drainage ditches and storm sewers were sprayed with oil. All private residences and public buildings were sprayed with D.D.T., neighborhoods where cases of polio had occurred were "fogged" with D.D.T., and open creek beds were dusted with D.D.T. from the air. It was recommended in the press that children should eat nothing out of doors and should eat only at home behind screens. Garbage cans with covers were required of everyone, chicken pens were removed from the city, stables were heavily sprayed with D.D.T. and every possible fly breeding place was eliminated. Each neighborhood undertook a vigorous clean-up campaign and reported to the health department any questionable areas where flies might thrive.

The subsequent course of the epidemic showed this gradual tapering off:

May 18	13 cases	1 death
May 25	13 cases	1 death
June 1	10 cases	1 death
June 8	6 cases	no deaths
June 15	8 cases	1 death
June 22	4 cases	1 death
June 29	6 cases	1 death
July 6	4 cases	no deaths
July 13	7 cases	1 death
July 20	3 cases	no deaths
July 27	2 cases	no deaths
August 3	1 case	no deaths
August 10	1 case	no deaths

In other words, a potentially serious epidemic came to a stop the second week of August at a time when the appearance of cases is usually at its height. Moreover, a proof of San Antonio's success was revealed in the continued spread of cases throughout other portions of the state.

At first, the usual differences of opinion in diagnosis of poliomyelitis and encephalitis took place, but the occurrence of classical paralyses soon eliminated these misconceptions. Also doubts were voiced about the manner of spread of the disease. Still, the San Antonio health authorities were convinced that polio was mainly fly-borne because of investigations made in their city by Dr. John Paul in 1942. Also the studies made in North Carolina in 1945, as well as in previous epidemics, revealed a close fly-food-patient con-

nection. It was felt that while experts might disagree over epidemiology, it was worthwhile to wage a pioneer anti-fly campaign in a community to see what could be accomplished. In Rockford, Illinois, in 1945, a part of the city was sprayed with D.D.T. from the air and in 1946 Miami tried a similar experiment without signal success. But, San Antonio performed the first city-wide, house-to-house, anti-fly experiment in an effort to combat polio and demonstrated that an epidemic could be stopped at the height of the summer season.

It was recognized that epidemiologists were turning to the view that "carriers" and direct contacts are the commonest sources of polio. Yet the San Antonio experiment produced striking results, and that was all the citizens of that community cared to know. A very determined Health Board and a highly cooperative medical profession made the experiment succeed with a minimum of dissension. The results were clear and the residents were easily convinced that any inconvenience they may have suffered early in the summer yielded ample compensation later when they saw a city of 400,000 free of polio while the disease continued its ravages in other parts of the same state.

WALTER G. STUCK, M.D.

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